SulTRAC

June 15, 2021

Mr. Nabil Fayoumi
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U.S. Environmental Protection Agency (EPA)
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Subject: Submittal of Final Remedial Action Report
Ottawa Radiation Areas, Operable Unit 4 (OU4), NPL-8 Frontage Property
Ottawa, LaSalle County, Illinois
Remedial Action Contract (RAC) 2
Contract No. EP-S5-06-02, Work Assignment No. 334-RARA-059Z

Dear Mr. Fayoumi:

SulTRAC is submitting an electronic copy via e-mail of the final report for the NPL-8 Frontage Property remedial action (RA); this PDF file includes Appendices A (Figures) and B (Tables). Electronic copies of other report appendices and attachments will also be sent to you via a Managed File Transfer (MFT) site. This submittal addresses agency comments received on the draft RA report and also includes the associated data validation reports and as-built certification.

If you have any questions regarding this submittal, please call me at (312) 201-7788.

Sincerely,

Jack Brunner
SulTRAC Project Manager

Enclosure

cc: Kelly Horn, Illinois Emergency Management Agency (with one hard copy)
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REMEDIAL ACTION CONTRACT 2
FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND
NON-TIME-CRITICAL REMOVAL ACTIVITIES
IN REGION 5

REMEDIAL ACTION REPORT

REVISION 1

OTTAWA RADIATION AREAS
NPL-8 FRONTAGE PROPERTY SITE
OPERABLE UNIT 4
LASALLE COUNTY, ILLINOIS

Prepared for
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604

Date Submitted:	June 2021
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Work Assignment No.:	334-RARA-059Z
Contract No.:	EP-S3-06-02
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TABLE OF CONTENTS

Section **Page**

APPENDICES

A. Figures
   1. Site Location
   2. Site Layout and Pre-Existing Site Conditions
   3. Parcel Boundaries
   4. Pre-Construction Surface Gamma Survey (2018)
   5. Remedial Design Objective
   6. Reference Grids and Proposed Excavation Areas
   7. Final Reference Grids and Final Excavation Limits
   8. Horizontal and Vertical Extents of Excavation
   9. Post-Excavation Gamma Walkover Survey
   10. Post-Excavation Verification Sample Locations
   11. Post-Excavation Verification Sample Results
   12. Post-Excavation Sidewall Survey Figures 12A through 12H
   13. Supplemental ROW Investigation Results, Downhole Gamma Survey and Field Gamma Spectroscopy
   14. Estimated Extended Area C with Investigative Test Pit Locations and Results, Field Gamma Spectroscopy
   15. Estimated Extent of Remaining ROW Contamination with Investigative Test Pit Locations and Results – Gamma Survey and Field Gamma Spectroscopy
   16. Bill Walsh Property Investigative Gamma Walkover Survey
   17. Bill Walsh Property Investigation Results – Downhole Gamma Survey and Field Gamma Spectroscopy
   18. Post-Backfill Surface Gamma Walkover Survey
   19. Compacted Contaminated Soil Stockpile Grades
   20. Compacted Contaminated Soil Stockpile Gamma Walkover Survey
   21. Post-Excavation Remaining Contamination Documentation – Bill Walsh Property, Personnel Park Area
   22. Final Grade As-Built Drawing

B. Tables
   1. Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
   2. Excavation Volume Variance Summary
   3. Verification Soil Sampling Results
   4. Backfill Quantities
   5. Perimeter Air Monitoring Results
   6. Personal Air Monitoring Results
   7. Particulate Air Monitoring Data
   8. Remedial Action Cost Summary

C. SulTRAC Weekly Reports

D. Field Logbook Notes

E. Data Validation Reports

F. Interim Site Inspection Reports

G. SulTRAC Final Inspection Report and Punch List

ATTACHMENTS

1. Compaction Test Results
2. Waste Manifests, Landfill Weight Tickets, and Waste Profile Documentation
3. Topsoil Analytical Results
4. SAHCI Data Package
5. TriEco Planning Documents
6. Hallaton Data Package
7. Record Drawings

ACRONYMS AND ABBREVIATIONS

µCi/mL	MicroCuries per milliliter
µg/m^3	Micrograms per cubic meter
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	Below ground surface
CA	Construction aggregate
CFR	Code of Federal Regulations
COC	Contaminant of concern
cpm	Counts per minute
CQAP	Construction Quality Assurance Plan
CQA	Construction quality assurance agent
DAC	Derived air concentration
EPA	U.S. Environmental Protection Agency
ET&D	Excavation, transport, and disposal
FSP	Field Sampling Plan
GPS	Global positioning system
HASP	Health and Safety Plan
IDNS	Illinois Department of Nuclear Safety
IEMA	Illinois Emergency Management Agency
IEPA	Illinois Environmental Protection Agency
I&M	Illinois and Michigan
LPI	Luminous Processes, Inc.
MAC	Maximum allowable concentration
MCL	Maximum contaminant level
mg/L	Milligram per liter
mL	Milliliter
NaI	Sodium iodide
NORM	Naturally occurring radioactive material
NPL	National Priorities List
O&M	Operations and maintenance
ORA	Ottawa Radiation Areas
OU	Operable unit

pCi/g	PicoCuries per gram
pCi/L	PicoCuries per liter
POTW	Publicly owned treatment works
QAPP	Quality Assurance Project Plan
QA/QC	Quality assurance and quality control
RA	Remedial action
RAC	Response Action Contract
RAO	Remedial action objective
Radium Dial	Radium Dial Company
RD	Remedial design
RI/FS	Remedial investigation/feasibility study
ROD	Record of Decision
RPP	Radiation Protection Plan
RSO	Radiation Safety Officer
SAHCI	Stan A. Huber Consulting Inc.
TACO	Tiered Approach to Corrective Action Objectives
TLD	Transparent luminescent detector
yd^3	Cubic yard
WA	Work assignment

EXECUTIVE SUMMARY

This executive summary report summarizes work completed by SulTRAC during the remedial action (RA) for the Ottawa Radiation Areas (ORA), Operable Unit (OU) 4, NPL-8 Frontage Property site, in LaSalle County, Ottawa, Illinois (the site). It was prepared under the U.S. Environmental Protection Agency (EPA) Remedial Action Contract (RAC) II for Region 5, Contract No. EP-S5-06-02, Work Assignment (WA) No. 334-RARA-059Z. RA activities included (1) mobilization and site preparation, (2) excavation and segregation of soils containing radium-226 at concentrations of 6.2 picoCuries per gram (pCi/g) or greater, (3) construction of a contaminated soil stockpile and cap on the NPL-8 landfill, (4) backfill of excavation areas, and (5) site restoration. RA activities began on July 11, 2019, with site-specific radiation training for key on-site personnel; the first day of excavation work was July 19, 2019. RA activities were completed with a final inspection conducted on August 14, 2020.

This document provides a brief site description and background and summarizes RA activities. Summarized activities include mobilization and site preparation, soil excavation, dewatering and water management, post-excavation radiation survey and verification sampling, supplemental investigations, backfill of excavation areas, contaminated soil stockpile cap construction, waste transportation and disposal, air monitoring, site restoration, demobilization, and green remediation. Post-RA inspections and certifications and operation and maintenance activities are also discussed, and a cost summary is presented.

Site Description and Background

The NPL-8 Frontage Property site encompasses an area of approximately 21 acres on State Route (SR) 71 in Rutland Township, LaSalle County, Illinois. SR-71 is also known as East Norris Drive or U.S. Route 6. Although most properties surrounding the site are within the City of Ottawa limits, the site itself is not within the city limits. NPL-8 consists of three parcels of land that include the Frontage Property and the Landfill. The NPL-8 Frontage Property is about 4 acres and is privately owned. The address of the Frontage Property parcel is 1820 East Norris Drive, Ottawa, LaSalle County, Illinois. The other two parcels are approximately 17 acres combined and are owned by the Illinois Department of Natural Resources (IDNR) (collectively termed NPL-8 Landfill). The IDNR-owned parcels (15-43-261-000 and 15-42-402-000) do not have a physical address. The Bill Walsh property, while not part of the NPL-8 Frontage Property, was also partially investigated and remediated as part of this RA.

Contamination at the Frontage Property site resulted from activities associated with two radium dial painting companies: The Radium Dial Company (Radium Dial), which operated in Ottawa from 1920

through 1932; and Luminous Processes, Inc. (LPI), which operated in Ottawa from 1932 through 1978. The source of contamination is radium sulfate paint used by Radium Dial and LPI in their dial painting operations. During operation at these companies, equipment, materials, buildings, and surrounding work areas became contaminated with radium-226, the major isotope of radium sulfate.

Moreover, radium-226-contaminated waste from the two radium dial painting companies was used as fill material at various landfills throughout the Ottawa area, including the site. Historical fill material was present throughout much of the site, and typical fill depths ranged from 0 to 24 feet. Debris from demolition of the Radium Dial facility in 1968 may have also been buried at the site.

Previous site investigations documented the presence of radium-226 contamination in the soil at the site. Radium-226 was identified as the primary contaminant of concern (COC) in soil. EPA's Records of Decision (ROD), dated September 24, 2003, and November 10, 2004, define the selected remedy for the NPL-8 Frontage Property site. The remedial action objective (RAO) for radium-226 defined in the ROD is 6.2 pCi/g.

Mobilization and Site Preparation

SulTRAC mobilized to the site on June 27, 2019, to begin site preparation, including establishing and constructing a support zone, establishing and constructing a contamination reduction zone, preparing various excavation areas in and around the established exclusion zone (EZ), and performing a utility clearance. Before mobilization, SulTRAC obtained necessary site access agreements and approval from both state and local government entities for various RA activities.

Soil Excavation

During the RA, material was screened and analyzed as it was excavated to ensure that radium-226-contaminated soil was not mingled with clean material.

Prior to excavation, a 10-meter by 10-meter (33-foot by 33-foot) grid system was developed for the site based on surface radiation surveys and the results of the delineation assessments. Soil excavation began on July 19, 2019. During excavation, soil was screened using a 2x2 sodium iodide (NaI) detector (Ludlum Model 44-10) coupled with a scaler/rate meter (Ludlum Model 2221) to delineate clean overburden and contaminated material. Each detector used for soil screening was equipped with a 6-inch lead collimator shield to reduce the effects of gamma "shine" because of the wide range of radium-226 concentrations on site. The excavator removed up to 18-inch lifts that were placed into no more than 10-

cubic-yard (yd^3) piles. The soil piles were categorized as either potentially radiologically clean (less than 6,500 cpm) or potentially radiologically contaminated (greater than 6,500 cpm).

Once field screened samples were analyzed using on-site field gamma spectroscopy, the 10-yd^3 pile was moved to either a clean overburden stockpile (less than 6.2 pCi/g) or the contaminated stockpile (greater than 6.2 pCi/g) on the NPL-8 Landfill. The clean overburden was stockpiled in non-radiologically contaminated areas of the site. The clean overburden stockpiles were covered in plastic to protect from saturation, erosion, and dust generation prior to being used as backfill material.

Thirteen excavation areas were remediated during the RA. The final excavation volumes for each of the 13 remediated areas are summarized below.

FINAL SOIL EXCAVATION VOLUMES (yd^3)

Excavation Area	Volume of Clean	Volume of Contaminated	Total Volume Excavated
A	356	97	452
B	1,013	586	1,599
D	1,039	928	1,967
G-1	12	0	12
G-3	15	6	22
G-4	139	135	275
G-5	39	0	39
HS-1	23	6	30
HS-2	174	170	344
HS-3	31	19	50
HS-4	60	242	303
ROW Spring 2020	200	158	358
Bill Walsh	5	115	120
Total Volume:	**3,108**	**2,462**	**5,571**

Notes:
CY - Cubic Yard

During excavation, material encountered was primarily silty clay with minor debris. More extensive fill was encountered within excavations near Area C and within Area D. Two distinct layers of fill material were identified in Areas C and D: (1) fill at the surface consisting of non-radiologically contaminated construction and demolition (C&D) debris, primarily concrete and asphalt with some tires and glass; and (2) fill beneath the C&D debris consisting of radium-226 contaminated debris, primarily brick, cinders, glass, and metal.

Dewatering and Water Management

If standing water was encountered within the excavation, an electric submersible 2-inch trash pump was utilized to dewater the excavation. Either in advance or when dewatering was needed, a small area was excavated to a depth of 1 to 2 feet below the excavation bottom and filled with CA1 aggregate to act as a sump and to prevent the trash pump from getting clogged. A hose was run from the pump to the dewatering pad on the NPL-8 Landfill. A filter bag was attached to the end of the hose during dewatering activities. No collection or off-site disposal of water from dewatering activities occurred during the RA.

Post-Excavation Radiation Survey and Verification Sampling

After excavation was completed on grid sections and before the excavation areas were backfilled, SulTRAC and SAHCI personnel conducted a final status survey consisting of surface radiation surveys and verification sampling from the bottom and sidewalls of the excavated area. Surface radiation surveys were performed to measure gamma radiation levels near the surface of the excavation and side walls. Verification sampling confirmed that average radium-226 levels were below the 6.2 pCi/g RAO for all sampled grid sections.

Supplemental Investigations

Supplemental investigations were necessary during the RA to determine the extent of remaining radium-226 contamination. The findings from these supplemental investigations were either (1) for confirmation and record sampling purposes when excavation extents met the scope of work for this RA, or (2) used to estimate extents and volumes when further excavation was necessary under the scope of work for this RA.

SulTRAC conducted three types of supplemental investigations during the RA, which included contaminated excavation wall surveys and sampling, soil boring sampling, and test pitting. These supplemental investigations and findings are summarized in detail in the RA report.

Backfill of Excavation Areas

After verification sampling confirmed that the RAO was met, the excavation areas were backfilled. Backfilling of excavation areas was conducted by first bridging the excavation surface with radiologically clean concrete or CA1 limestone, as needed. Stockpiled clean overburden was then used as backfill and compacted, per RD specifications, for testing across the site. Saturated backfill soil was first mixed with drying agent prior to backfill and compaction. Between mixing, Calciment and bulk lime were used as drying agents within both the clean overburden stockpile soil and contaminated stockpile material staged on the NPL-8 Landfill.

Once there was no longer any on-site clean overburden available for backfill, clay provided by the City of Ottawa was used. The City of Ottawa provided the clay backfill material in accordance with the in-kind services provisions of the 2010 Consent Decree between the City of Ottawa and the U.S. Department of Justice regarding the ORA Superfund site.

The Frontage Property, ROW, and Bill Walsh property excavation areas were backfilled, compacted, and graded to 6 inches below original grade prior to site restoration activities.

The quantities of backfill materials used to fill excavation areas during the RA are summarized below.

BACKFILL QUANTITIES

Project Phase	CA1 (Tons)	City of Ottawa Clay Backfill (Cubic Yards)	Clean Overburden (Cubic Yards)	Drying Agent[a] (Ton)
Remedial Design (RD) Estimate	2,632	3,899	5,236	100
RA Total Backfill	**369.32**	**1,543**	**3,108**	**348.81**
Change from RD to RA	-2,262.68	-2,356	-2,128	+248.81

Note:

a. A total of 10 tons of Calciment and 338.81 tons of bulk lime were used as drying agents.

Contaminated Soil Stockpile Cap Construction

Contaminated soil stockpile construction was completed in accordance with RD specifications. The contaminated soil stockpile cap is a low-permeability cap and was constructed in accordance with Title 35 of the Illinois Administrative Code Part 811 requirements. The cap consists of non-woven geotextile, geosynthetic clay liner, high-density polyethylene liner, and geocomposite, with a freeze-thaw protection layer consisting of 2.5 feet of clay and 0.5 foot of topsoil. To prevent erosion, topsoil was seeded, and a straw erosion control blanket was placed over the top until vegetation established.

SulTRAC's project engineer was on site during the final contaminated soil stockpile grading and the cap construction to determine compliance with the RD specifications. The contaminated soil stockpile construction began on July 20, 2020, and was completed on August 14, 2020. SulTRAC conducted post-RA site inspections to ensure no corrective actions were required following completion of the constructed contaminated soil stockpile.

Waste Transportation and Disposal

No radium-226-contaminated soil was disposed of off-site during these RA activities. All radium-226 contaminated soil excavated during the RA, totaling 2,462 yd^3, was stockpiled on the NPL-8 Landfill and then capped.

SulTRAC received approval from U.S. Ecology's Wayne Disposal, Inc. (Wayne Disposal) facility in Belleville, Michigan, for disposal of non-Department of Transportation (DOT) regulated debris in contact with soil containing low concentrations of radium-226. The description within the waste manifests stated "low concentrations of radium-226" and referred to the average total radium concentration of 26.5 pCi/g of all soil within the constructed contaminated stockpile at the time the waste profile was signed by EPA on May 21, 2020. Only waste that came into contact with soil containing low concentrations of radium-226 was transported for off-site disposal.

A total of 13.49 tons of non-DOT regulated debris that came into contact with soil containing low concentrations of radium-226 was shipped from NPL-8 to the Wayne Disposal facility. The waste or debris included personal protective equipment, plastic, discarded geofabric, silt fence, metal debris, etc. that came in contact with soil containing low concentrations of radium-226.

Non-radiologically contaminated debris and general refuse was collected in 10 yd^3 roll-off dumpsters and shipped off site for disposal by Advanced Sanitation.

Air Monitoring

Perimeter particulate air monitoring was performed every workday during excavation (unless precipitation or other adverse weather conditions occurred) using a Staplex Model TFIA high-volume air sampler. The samples collected were analyzed for radium-226 and results were below the radium-226 air effluent limits.

Personal lapel sampling equipment was assigned to workers. Gilian Model BDXII low-volume personal air samplers, or equivalent, were used to collect breathing zone air samples during site operations from two workers within the exclusion zone per workday. The personal air monitoring results were below the site administrative limit of 10 percent of the derived air concentration for radium-226.

Continuous real-time particulate air monitoring was also conducted while parcels were being excavated. One TSI DustTrack DRX unit was used for downwind particulate monitoring; data were logged and downloaded from the units daily. The alarm on the unit was set to 2.5 milligrams per cubic meter in accordance with SulTRAC's health and safety plan. The alarm would flash a light as well as sound a series of beeps if this level was exceeded. The levels measured during the project ranged between 1 and 200 micrograms per cubic meter, all of which were below the action limit.

Site Restoration

Site restoration primarily involved final grading of backfill, CA6 (limestone gravel) finish grading with compaction or topsoil finish grading with seeding and erosion control measures, silt fence removal, fence repair or replacement, and NPL-8 Landfill gate relocation.

Another anticipated site restoration activity was the locating and abandonment of monitoring well MW-64. Excavation was conducted in the area where MW-64 was expected to be located; however, MW-64 could not be found. Based on subsequent discussions with EPA and IEMA, no further effort to abandon this well was taken.

Demobilization

A full demobilization was completed at NPL-8 at the completion of site restoration activities, the final gamma walkover survey, and final Post-RA inspection on August 14, 2020.

Green Remediation

SulTRAC incorporated green and sustainable remediation approaches during the site RA in accordance with EPA, Illinois Environmental Protection Agency (IEPA), and other relevant guidance. These approaches included reuse of fill materials, recycling, use of local businesses, use of local staff, saving energy and water, dust mitigation, erosion control, on-site soil sample analysis, and revegetation, as well as associated cost savings.

Inspections and Certifications

SulTRAC conducted a pre-final site inspection along with representatives of TriEco, EPA, and IEMA on July 29, 2020, when RA activities were substantially complete, including backfill of all excavation areas and installation of the clay freeze-thaw cap over the contaminated soil stockpile. SulTRAC also conducted a pre-final site inspection with the Grand Rapids Enterprises, Inc. property owner on August 12, 2020. The purpose of these site walks was to review the status of the remediation activities and to ensure the scope of work was fully achieved, as well as to create a punch list of items to be addressed prior to demobilization

activities. SulTRAC and TriEco subcontractor M-2 conducted a final RA inspection on August 14, 2020, and observed that all punch list and other items had been completed.

In addition to meeting project cleanup goals, the RA was implemented in accordance with the design plans and specifications, unless otherwise approved by EPA or IEMA, and is therefore fully operational and functional.

Operation and Maintenance

After RA activities were completed, the site was returned to its previous conditions.

SulTRAC also conducted post-RA routine operation and maintenance site visits about once per month through April 2021 to monitor vegetation growth, potential erosion, and other site conditions in restored areas and on the contaminated soil stockpile that may require attention.

Cost Summary

The NPL-8 Frontage Property RA costs were approximately $3.7 million. A summary of remedial action costs is presented below.

REMEDIAL ACTION COST SUMMARY

Activity/Subcontract	Cost	
Excavation and Waste Management		
Submittals, Permits, and Bonding	$ 88,000	
Site Preparation, Site Maintenance, and Mobilization/Demobilization	$ 191,000	
Waste Excavation and On-Site Management	$ 586,000	
Radioactive Waste Stockpile Construction and Capping	$ 279,000	
Radioactive Waste Off-Site Disposal	$ 14,000	
Dewatering	$ 142,000	
Backfilling	$ 142,000	
Surveying	$ 57,000	
Site Restoration	$ 41,000	
	Subtotal	$ 1,540,000
Health Physics Support and On-Site Analytical Services		$ 380,000
Off-Site Analytical Services		$ 13,000
Support Zone and other Property Access		$ 15,000
Management, Engineering, and Verification Sampling		$ 1,747,000
Total		**$ 3,695,000**

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Region 5 tasked SulTRAC to prepare this remedial action (RA) report for the Ottawa Radiation Areas (ORA) Operable Unit 4 (OU 4), NPL-8 Frontage Property site, in LaSalle County, Ottawa, Illinois (the site) (EPA 2014). SulTRAC prepared this report under EPA Remedial Action Contract (RAC) II for Region 5, Contract No. EP-S5-06-02, Work Assignment (WA) No. 334-RARA-059Z. Under this WA, SulTRAC implemented the RA in accordance with the objectives of the remedial design provided within the NPL-8 Frontage Property Remedial Design (SulTRAC 2019a). The proposed RA activities included (1) mobilization and site preparation, (2) excavation and segregation of soils containing radium-226 at concentrations of 6.2 picoCuries per gram (pCi/g) or greater, (3) construction of a contaminated soil stockpile and cap on the NPL-8 landfill, (4) backfill of excavation areas, and (5) site restoration.

This document formally reports the cost and performance information for the RA completed at the NPL-8 Frontage Property site. This report incorporates guidance from "*Guide to Documenting Cost and Performance for Remediation Projects,*" Federal Remediation Technologies Roundtable EPA 542-B-95-002 March 1995, *"Closeout Procedures for National Priorities List Sites, Appendix A,*" Office of Solid Waste and Emergency Response Directive 9320.2-22 May 2011, and "*A Guide to Preparing and Reviewing Remedial Action Reports of Cost and Performance,*" U.S. Army Corps of Engineers CEMP-R EP 1110-1-19, 30 June 2001.

RA activities began on July 11, 2019, with site-specific radiation training for key on-site personnel; the first day of excavation work was July 19, 2019. Backfill of all excavations, restoration work, winterization of the contaminated soil stockpile with geofabric cover, and demobilization for the winter was completed on December 27, 2019. Routine and weather-related site inspections were conducted from January 2020 to April 2020.

SulTRAC conducted additional RA activities in spring 2020 that began with excavation in the right-of-way (ROW) on April 27, 2020 and ended on June 19, 2020. Final grading and compaction of the contaminated soil stockpile on the NPL-8 landfill was completed in June 2020 and cap installation over the contaminated soil stockpile was completed in July 2020. On August 14, 2020, a final inspection documented the completion of the RA, after which demobilization from the site was completed the same day. SulTRAC also conducted routine site inspections to monitor stockpile cap integrity and vegetation establishment as part of site restoration from August 2020 through April 2021.

2.0 SITE DESCRIPTION

This section presents the site location and description, site background information, and historical investigation and remedial actions; this section also summarizes the scope of work for this project. Figures and tables referenced in this report are included in Appendices A and B.

The NPL-8 site encompasses an area of approximately 21 acres abutting State Route (SR) 71 in Rutland Township, LaSalle County, Illinois (see Figure 1). SR-71 is also known as East Norris Drive or U.S. Route 6. Although most properties surrounding the site are within the City of Ottawa limits, the site itself is not within the city limits (City of Ottawa 2021). RA activities took place on three properties that include the Frontage Property, the Landfill, and Bill Walsh Property (see Figure 2). The NPL-8 Frontage Property is about 4 acres and is privately owned with a street address of 1820 East Norris Drive. The third property is the Bill Walsh Property, which is located adjacent to and east of the Frontage Property. Figure 3 shows the parcels that encompass these properties. Two of the parcels consisting of approximately 17 acres combined are owned by the Illinois Department of Natural Resources (IDNR) (collectively termed NPL-8 Landfill). The IDNR-owned parcels (15-43-261-000 and 15-42-402-000) do not have a physical address. The Frontage Property is bordered on the north and west by the NPL-8 Landfill, east-southeast by SR-71, and southwest by the Bill Walsh Auto car dealership. The portion of the Fox River near the site is classified as an Illinois Natural Area Inventory site. NPL-8, inclusive of the site and landfill areas, is approximately 2.8 nautical miles northeast (upstream) from the confluence of the Fox and Illinois Rivers (EPA 2003), as shown on Figure 1.

Current and previous property owners have provided EPA and state agencies with access to the NPL-8 Landfill via entrance gates on the Frontage property, which are the only access to the NPL-8 Landfill property.

In 1990, the Frontage property was owned by Midwest Landscape Company, which is now defunct (LaSalle County Recorder's Office 1990). The duration of Midwest Landscape Company's operation at the site is unknown. The Frontage property was also previously known as the Rowe property. The property is currently owned by Grand Rapids Enterprises, Inc. (GRE), a construction and associated equipment supply company. GRE acquired the property in 2007 (LaSalle County Assessor 2019) and uses the Frontage property as a storage yard. Materials and equipment staged on the site include topsoil and fill material, dump trucks, sections of polyvinyl chloride (PVC), ductile iron pipe, intermodal containers, and miscellaneous construction equipment and trailers. The site is improved with one approximately 1,900-square-foot, slab-on-grade, wood-framed building located on its southern portion. Also, according to GRE, a septic tank was installed immediately northwest of the on-site building, and one potable water well

was located at the southwest corner of the site. However, no information regarding the septic tank was available. A deep monitoring well (MW-64) was installed within the north-central portion of the site during a 1998 remedial investigation (RI). The monitoring well was not currently visible, and the location and disposition of the well is unknown. Prior to 2012, two 1,000-gallon-capacity underground storage tanks (UST) formerly used to store gasoline and diesel were also present near the southwest corner of the site. The UST system was removed on January 8, 2013 (Dynamic Environmental Services [DES] 2013). Section 2.2 discusses the UST removal and investigation.

2.1 SITE GEOLOGY

Three distinct geologic strata underlie the site. The uppermost stratum consists of fill material. Underlying the fill material is a silty clay glacial till. The upper portion of the silty clay till contains a weathered portion, characterized by ferric oxidation associated with fractured and ironstone concretions; the lower portion of the silty clay till is uniformly gray. The till is stiff and dry and appears to be acting as an aquitard for perched groundwater. The St. Peter Sandstone bedrock underlies the till and was encountered at approximately 25 feet below ground surface (bgs) during groundwater monitoring well installation activities, as documented in the 1998 RI report (Weston 1998).

During RA activities at the ORA NPL-4 site, which is less than 1 mile southwest of the NPL-8 Frontage Property, competent shale of the Carbondale Formation was observed at the base of the clay till at approximately 15 feet bgs. SulTRAC determined the native shale was likely acting as an aquitard, limiting migration to the underlying St. Peter Sandstone. The geographic extent of this residual shale unit was reported to be limited and it is uncertain whether it is present at the NPL-8 Frontage Property (SulTRAC 2016).

The St. Peter Sandstone bedrock is the potable aquifer in the area. Groundwater flow direction within the St. Peter aquifer below the site is presumed to the southwest. The aquifer has a high transmissivity which is report to exceed 20,000 gallons per day per foot (gpd/ft) have been reported (Weston 2003a).

Well records from the Illinois State Geological Survey indicate 231 registered groundwater wells are located within a 2-mile radius of the site. Most of the wells are screened within the St. Peter Sandstone at a depth of between 9 and 164 feet bgs. Many of these wells were likely inactive because the City of Ottawa municipal wells supply drinking water to city residents. Residents outside the Ottawa city limits draw their water from private wells screened in the St. Peter Sandstone aquifer (Weston 2003a).

Natural surface drainage patterns at the site have been altered by landfilling and construction activities. Ground surface elevations range from 477 feet above mean sea level (MSL) near the center of the site to 485 feet above MSL near the southern portion of the site. Overland flow is minimal because of the relatively flat topography. The site is not located within a flood plain (EPA 2003).

Fill material at the site originated from two sources: historical fill from previous landfilling and clay fill suspected to have been used as cover for landfilling activities. Historical fill material is present throughout the site. A 1939 aerial photo shows a historic pond in an area where fill was encountered at its greatest depth. The pond was likely drained and filled in during landfilling activities. The fill material consists primarily of glass, slag, ash, cinder, brick, and general construction debris. Fill ranged to a depth of as great as 24 feet bgs near the northeastern section of the site in the area of the former pond (EPA 2003). Filling at the site has continued across the site and is ongoing, particularly to the northeast, as part of GRE's current activities.

2.2 SITE BACKGROUND

The NPL-8 Frontage Property is one of 14 sites, termed Ottawa Radiation Areas (ORA), located in the Ottawa area. Radiological contamination at the ORAs resulted from activities associated with two radium dial painting companies: The Radium Dial Company (Radium Dial), which operated in Ottawa from 1920 through 1932; and Luminous Processes, Inc. (LPI), which operated in Ottawa from 1932 through 1978. The source of contamination is radium sulfate paint used by Radium Dial and LPI in their dial painting operations. During operation at these companies, equipment, materials, buildings, and surrounding work areas became contaminated with radium-226, the major isotope of radium sulfate.

Radium-226-contaminated waste from the two radium dial painting companies was used as fill material at various ORAs throughout the Ottawa area, including the site. Debris from demolition of the Radium Dial facility in 1968 may have also been buried at NPL-8 (Weston 2003a).

Initially, EPA targeted the 14 ORAs for investigation and cleanup. On July 29, 1991, EPA added the ORAs, including NPL-8, to the National Priorities List (Weston 2003a). Two additional areas were found after the listing, and the current total of ORAs is 16. Cleanup activities were prioritized in residential areas and at properties near residences to minimize risk of imminent exposure to the public.

The NPL-8 Frontage Property was originally considered part of the NPL-8 Conservation Area, which is discussed in EPA's Record of Decision (ROD) dated September 8, 2000 (EPA 2000). EPA later separated the NPL-8 Frontage Property from the NPL-8 Landfill site when additional contamination was

discovered during an investigation in fall 2002. EPA's 2003 ROD defined the selected remedy for the NPL-8 Frontage Property (EPA 2003).

2.3 HISTORICAL SITE INVESTIGATIONS

EPA and others have conducted several historical site investigation activities at the NPL-8 Frontage Property site. Investigation activities summarized in this section include an initial aerial radiological survey and site inspections, a remedial investigation/feasibility study (RI/FS) and related studies, UST investigations, a pre-RA gamma survey, and a pre-RA supplemental investigation.

SulTRAC used results from the gamma surveys, coupled with soil analytical results from the RI and pre-RA supplemental investigation, to identify hotspots targeted for removal as part of this RA.

Initial Aerial Radiological Survey and Inspections

In May 1986, the U.S. Department of Energy (DOE) performed an aerial radiological survey of Ottawa. Elevated radioactivity was identified at 11 areas. In July 1986, the Illinois Department of Nuclear Safety (IDNS) (currently known as Illinois Emergency Management Agency [IEMA]) conducted extensive radiological surveys of these areas and of additional locations identified by other parties. Based on results of the IDNS surveys, remedial actions (RA) involving soil excavation were implemented at several residences (Weston 2003a).

In December 1987, EPA conducted site inspections throughout the Ottawa area that included a street-by-street gamma radiation survey to locate additional areas with anomalous levels of radiation. Radiological surveys identified five additional sites with anomalous levels of radiation originating from an anthropogenic source (Weston 2003a).

RI/FS and Related Studies

In 1998, EPA prepared an RI report for the NPL-8 Conservation Area that included both the Landfill portion and the Frontage property. In addition to results of the RI, the report included human health and ecological risk assessments. The RI included: a geophysical survey, a surface radiation survey, a radon flux survey, a soil boring investigation and sampling, a downhole gamma survey, monitoring well installation, groundwater sampling, surface water and sediment sampling, and residential well sampling (Weston 1998).

As part of the 1998 NPL-8 RI, soil and groundwater samples were collected and analyzed for radium-226. Ten soil borings and one monitoring well were advanced on the site during the NPL-8 RI. During the groundwater investigation, the monitoring well (MW-64) was installed as a side-gradient well within the north-central portion of the Frontage property to total depth of 43 feet bgs. Radium-226 concentrations in MW-64 were found below laboratory detection limits. A total of 15 soil borings were advanced at the site during the 1998 RI and analyzed for radium-226 and radium-228. Samples from one soil boring (SS67) were also analyzed for uranium-238, uranium-235/236, and thorium-232. Radium-226 concentrations exceeded the remedial action objective (RAO) of 6.2 pCi/g for radium-226 in soil at two locations, SB-70 (11 pCi/g at 0 to 0.5 feet bgs) and SB-82 (49.9 pCi/g at 1 to 3 feet bgs). The NPL-8 RI report estimated the approximate volume of site soil contaminated with radium-226 as 1,000 cubic yards (yd^3). However, given the limited number of soil samples that had been collected at the site, Weston recommended additional sampling to further characterize soil at the site in order to verify assumptions regarding extent of contamination (Weston 1998; 2003a).

The 1998 RI report included a human health risk assessment (HHRA). The HHRA contained risk estimates for radium-226 and radium-228, as well as other constituents in soil and groundwater including metals and polycyclic aromatic hydrocarbons (PAH). Risks and hazards were estimated for the site under recreational and residential land use scenarios. Cancer risks at the site from indoor inhalation of radon gas and its progeny from on-site soil exceeded the upper end of EPA's acceptable risk range of 1E-06 to 1E-04 for residential receptors (Weston 1998).

In 2003, supplemental site investigation activities included a surface radiation survey and soil boring investigation and subsurface soil sampling. No groundwater monitoring wells were installed, and no groundwater sampling occurred during this RI. Results from the surface radiation survey identified four main areas of elevated gamma levels on site at the soil surface or near surface. Areas of surface contamination were noted and identified as Areas A through F. A total of 76 soil borings were advanced as part of the 2003 RI at the site, with 70 soil samples collected for laboratory analysis for radium-226 and radium-228. The highest concentrations of radium-226 detected in each area of contamination were as follows: 15 pCi/g at SB-44 (Area A), 16 pCi/g at SB-30 (Area B), 1,500 pCi/g at SB-08 (Area C), 9,800 pCi/g at SB-55 (Area D), 35 pCi/g at SB-48 (Area E), and 22 pCi/g at SB-39 (Area F) (Weston 2003a).

A 2003 screening level risk assessment of the site evaluated potential health impacts associated with radiological contaminants present within the soil. Risks that exceeded the upper end of the risk management range (1E-04 excess cancer risk) were identified for a number of exposure scenarios

including residential, trespasser, recreational, and commercial/industrial. Under the construction worker scenario, excess cancer risks were within the 1E-06 to 1E-04 risk management range (Weston 2003b).

In 2003, a supplemental FS evaluated the potential remedial options for the site. Remedial alternatives included excavation, volume reduction, perched water collection, institutional controls, and off-site disposal. The FS was prepared assuming that remediation of the NPL-8 Frontage Property and Landfill would occur at different times (Weston 2003c).

The EPA 2003 ROD specified the remedy for the site and included an RAO of 6.2 pCi/g for radium-226 in soil. The remedy included the following components (EPA 2003):

- Excavation of soil contaminated with radium-226 above 6.2 pCi/g to a maximum depth of 10 feet bgs
- Segregation of clean excavated material to reduce disposal volume
- Collection and treatment of encountered perched water during excavation as necessary, and discharge to the surface water or to the City of Ottawa's wastewater treatment system
- Backfilling of excavated areas with clean material
- Disposal of excavated contaminated material at a licensed radioactive material or an off-site landfill
- Implementation of institutional controls

In 2004, a Treatability Study Evaluation (TSE) Report for the NPL-8 Landfill and the site evaluated use of a segmented gate system (SGS) to separate on-site excavated soils containing radium-226 concentrations above the RAO of 6.2 pCi/g from those that met the RAO. In addition, the correlation of field screening measurements in counts per minute (cpm) to analytical data in pCi/g for different soil types and moistures was evaluated. The SGS unit is a combination of conveyor systems, radiation detectors, and computer controls that sorts radiologically contaminated soil from a moving feed supply bed on a conveyor belt, ultimately separating out soil above a predetermined criterion level for further processing and disposition. The total amount of soil processed at NPL-8 (Landfill and the site) was about 1,060 metric tons, with about 640 metric tons containing radium-226 exceeding the RAO successfully separated. The separation percentage was about 40 percent. However, additional analyses revealed a greater than 70 percent failure rate. Based on these results, SGS was not recommended for full-scale implementation (Weston 2004).

In 2006, a water filtration study was conducted to determine physical filtration size and type required for treating encountered groundwater at NPL-8 (inclusive of the Landfill and the site). Two shallow groundwater monitoring wells, MW-14 (total depth of 24 feet bgs) and MW-82 (total depth of 26 feet

bgs) were selected for this study. The wells were constructed within the NPL-8 Landfill, and therefore may not be indicative of conditions at the site. Three 1-liter water samples were collected from the monitoring wells (one sample representative of each well and a third composite sample representative of remaining purged water from both wells) and were transferred to a laboratory for analysis. Results indicated that no radium-226 was present on particles exceeding 5 microns in size. Some of the detected radium-226 was found to be in a dissolved state or on particles under 0.45 micron. The study suggested that radium filtration was not considered technically practical for RA activities because of the size of the particles containing radium-226, and also because dissolved-state radium concentrations could not be removed by application of physical filtration techniques (Weston 2006).

In 2007, Weston prepared a final (100 percent) remedial design (RD) report for the site, including excavation to 10 feet bgs, and transport and off-site disposal at a radioactive material landfill of soil containing radium-226 above the RAO. The remedial design estimated that 20,000 tons (approximately 16,666 yd^3) of soil above 10 feet bgs would require remediation (Weston 2007).

UST Investigations

In 2013, the current site owner, GRE, removed one 1,000-gallon diesel UST and one 1,000-gallon unleaded gasoline UST. No free product was observed during removal activities. Seven of eight soil samples collected from the tank excavation sidewalls and floor contained petroleum-related compounds, such as benzene, toluene, ethylbenzene, xylenes, and/or PAHs at concentrations above Illinois Environmental Protection Agency (IEPA) Tiered Approach to Corrective Action Objectives (TACO) Tier 1 cleanup objectives. Benzene was detected in soil at concentrations up to 14,400 micrograms per kilogram (µg/kg), ethylbenzene up to 33,300 µg/kg, toluene up to 128,000 µg/kg, xylene up to 192,000 µg/kg, and naphthalene up to 9,330 µg/kg (DES 2013). IEPA noted that no removal or disposal of soil had been conducted and also noted a potable well within 10 feet of the UST removal area (IEPA 2013a, 2013b).

In November 2018, GRE commissioned a site investigation of the former UST area, which included the installation of seven soil borings advanced to 20 feet bgs. Of 21 soil samples collected, only two samples(both from MW-2 at 7 to 8 and 12 to 13 feet bgs) contained benzene, toluene, ethylbenzene, or xylenes (BTEX) compounds with benzene up to 47.3 mg/kg, ethyl benzene up to 72.6 mg/kg, toluene up to 258 mg/kg), and xylene up to 431 mg/kg. Naphthalene was also detected at up to 6.23 mg/kg. The BTEX and naphthalene results are above the most stringent IEPA TACO Tier 1 Class 1 soil remediation objectives.

Five of the seven boring locations were converted to shallow monitoring wells (MW-1 through MW-5 on Figure 2). The monitoring wells were sampled in January 2019. The groundwater analytical results indicated that monitoring well MW-2 contained benzo(a)anthracene up to 0.38 µg/L and benzo(a)pyrene up to 0.6 µg/L above IEPA TACO Tier 1 Class 1 groundwater remediation objectives. Depth to water in the monitoring wells ranged from 11.7 to 16.9 feet bgs. Corrective action to address soil and groundwater contamination is planned, if approved by IEPA (DES 2019).

Pre-Construction Gamma Surveys and Other Supplemental Investigations

In June 2018, SulTRAC performed a pre-construction gamma walkover site survey to verify results from previous studies and further delineate the extent of surficial radiological contamination from radium-226. The survey was conducted to update the 2002 IEMA gamma survey and to evaluate elevated surficial contamination, which was noted in the prior survey as areas G-1 through G-6. Measurements were obtained by use of a shielded, collimated, 2x2 sodium iodide (NaI) detector coupled with a scaler/rate meter and a hand-held Global Positioning System (GPS) unit. SulTRAC's gamma survey identified eight areas designated as Hot Spots (HS-1 through HS-8) where elevated readings were 5,000 cpm or greater (see Figure 4). In addition to on-site gamma readings, background surficial readings were also taken at five off site locations (see Figure 4). Background gamma readings averaged about 2,595 cpm (SulTRAC 2018).

In 2019, SulTRAC conducted a supplemental investigation to support updating the RD and to implement the corresponding RA activities. As part of the supplemental investigation, SulTRAC (1) installed and sampled two piezometers (PZ-B and PZ-D) on the site within areas of deepest anticipated RA excavation (see Figure 2), (2) conducted a gamma survey in Area HS-2 within the ROW south of the site, (3) collected soil samples at Area HS-2, and (4) measured groundwater levels at the two piezometers installed on the site and from the five shallow monitoring wells within the NPL-8 Landfill adjacent to and north and west of the site. The depth to groundwater ranged from 12.95 to 18 feet bgs with no groundwater observed in piezometer PZ-D to a depth of 21.79 feet bgs. SulTRAC submitted one groundwater sample and one duplicate sample collected from PZ-B and analyzed the samples for radium-226, radium-228, target analyte list (TAL) metals, pesticides, PCBs, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and sewer discharge parameters including oil (hexane soluble), biological oxygen demand (BOD), fluoride, hexavalent chromium, total cyanide, total phenol, total suspended solids (TSS), and pH. Only iron exceeded City of Ottawa sewer discharge standards at concentrations up to 36.5 milligrams per liter (mg/L). The following contaminants exceeded EPA Regional Screening Levels for tap water or IEPA TACO Class I and II groundwater ingestion exposure route standards: arsenic (15

micrograms per liter (µg/L)), cobalt (17.7 µg/L), iron (36,500 µg/L), lead (27.2 µg/L), and manganese (1,850 µg/L). Radium-226 was detected in soil at HS-2 at concentrations ranging from 19.5 to 23.3 pCi/g at a depth of 0 to 1-foot bgs (SulTRAC 2019b).

In March 2019, SulTRAC also measured the depth to groundwater and total depth of the monitoring wells installed as part of the UST investigation. The depth to groundwater ranged from 9.2 to 12.6 feet bgs and total depth ranged from 18.5 to 20.2 feet bgs.

2.4 REMEDIAL ACTION

SulTRAC implemented the RA in accordance with the objectives of the 2019 RD (SulTRAC 2019a). The 2019 RD estimated the total volume of soil to be excavated, including clean overburden, at 9,524 yd^3. The total volume of soil exhibiting radium-226 concentrations exceeding 6.2 pCi/g was estimated at 4,289 yd^3. Figure 5 depicts the RD objectives, including the estimated extent of contamination identified for removal.

To meet the RD objectives, the scope of work for the NPL-8 Frontage Property RA involved the following primary components:

- Excavate soil on site and along the frontage ROW and segregate it into the following categories:
  - Uncontaminated soil containing radium-226 < 6.2 pCi/g
  - Contaminated soil containing radium-226 >6.2 pCi/g
- Screen excavation floors and sidewalls to identify radioactive contamination to further guide excavation
- Conduct on-site gamma spectroscopy of soil to characterize soil containing radium-226 at concentrations above 6.2 pCi/g
- Off-site laboratory confirmatory analysis of on-site gamma spectroscopy results
- Load contaminated soil containing radium-226 above 6.2 pCi/g for on-site transport and placement in an engineered stockpile on adjacent NPL-8 Landfill site
- Perform grading and compaction of stockpile and install a Title 35 Part 811 triple-layer cap over stockpile
- Backfill excavated areas with clean fill consisting of uncontaminated overburden, excavated uncontaminated soil found to be below 6.2 pCi/g, or soils from an off-site City of Ottawa borrow source and granular material
- Conduct a final status survey and soil verification sampling of excavated areas on Area B
- Conduct perimeter air monitoring during RA
- Conduct personal air monitoring during RA
- Restore the site to pre-RA conditions

3.0 CONSTRUCTION ACTIVITIES

This section describes construction activities, including mobilization and site preparation, remediation activities, waste transportation and disposal, air monitoring, site restoration, demobilization, and green remediation completed as part of the RA at NPL-8 Frontage Property.

3.1 MOBILIZATION AND SITE PREPARATION

In preparation of RA activities, mobilization began on June 27, 2019, with the delivery of office trailers and a Conex box. Beginning the week of July 8, 2019, equipment was mobilized to the site, including radiation monitoring and laboratory equipment as well as an excavator. On July 11, 2019, SulTRAC held a site safety and RA kick-off meeting for key personnel from SulTRAC, SulTRAC's remedial subcontractor TriEco, and TriEco's subcontractor M-2. SulTRAC's Radiation Safety Officer (RSO) subcontractor, Stan A. Huber Consultants Inc. (SAHCI), conducted site-specific radiation training and conducted additional separate site-specific radiation training meetings for new personnel, as needed throughout the RA.

SulTRAC, SAHCI, TriEco, and M-2 established and constructed a support zone, a contamination reduction zone (CRZ), and prepared various excavation areas in and around the established exclusion zone (EZ) (see Figure 6).

The support zone consisted of the following:

- Two office trailers, one for SulTRAC that contained the SAHCI on-site field gamma spectroscopy system and one for TriEco.
- A Conex box for equipment storage as well as temporary soil pile sample storage and cataloging.
- Sanitary facilities, including port-o-johns and hand washing stations.
- An access gate between the adjacent Bill Walsh property and the Frontage Property to be used for personnel vehicle parking.

At all times during RA activities, the support zone was demarcated from the exclusion zone with temporary fencing, orange construction fence, or yellow caution tape.

The CRZ acted as the only ingress and egress for personnel and small equipment between the support zone and the EZ and was the only open access point along the demarcation between the support zone and the EZ. The CRZ consisted of the following:

- A control line as a visual indication of where personal protective equipment (PPE) used in the EZ and potentially radiologically contaminated was to be removed prior to personnel crossing from the EZ into the CRZ for personal frisking for radiological contamination.

- A drum marked with a "radiological material" sticker for all PPE used in the EZ and other small potentially radiologically contaminated disposable items.
- Tables for personnel frisking with daily personnel logs for EZ ingress and egress.

Additional mobilization and site preparation activities included the following:

- Adding an electrical power drop and electrical hook-up to the trailers.
- Installing fencing around the EZ, CRZ, and support zone.
- Clearing and grubbing vegetation from the designated footprint of the contaminated soil stockpile area on the NPL-8 landfill by M-2's subcontractor The Tree Guy.
- Installing silt fencing on the Frontage Property and on the NPL-8 Landfill
- Constructing a clean haul road on the NPL-8 Landfill to access the proposed footprint of the contaminated soil stockpile
- Constructing a decontamination pad and water discharge pad on the NPL-8 Landfill
- Performing utility clearance.
- Establishing power cord layout for high-volume perimeter air monitoring stations
- Setting up dewatering, decontamination, and dust suppression systems, as needed.

SulTRAC developed a 10-meter by 10-meter (33-foot by 33-foot) grid system for the site based on surface radiation surveys and the results of the delineation assessments. During mobilization, SulTRAC measured and demarcated the grids using signage on the surrounding chain-link fence. The grid started at the southwestern corner of Area A and extended northeast into Area D (see Figure 6). As areas expanded for the spring 2020 right of way ROW excavation and Bill Walsh property excavation, grids A', B,' and C' were added (see Figure 7).

Initial mobilization activities were completed on July 18, 2019. Two additional smaller mobilizations occurred during RA activities. The second mobilization occurred on April 27, 2020, following a winter site shutdown. The third mobilization occurred on July 20, 2020, with the arrival of liner materials for the contaminated soil stockpile cap construction. In all cases, site trailers and the Conex box were left in place with equipment and remobilization effort was minimal.

3.2 REMEDIATION ACTIVITIES

The following subsections describe the specific tasks and results associated with the following remediation activities:

- Soil Excavation
- Post-Excavation Radiation Survey and Verification Sampling
- Supplemental Investigation

- Backfill of Excavation Areas
- Post-Backfill Radiation Surveys of Excavation Areas
- Contaminated Soil Stockpile Cap Construction
- Additional Radiation Surveys

SulTRAC personnel collected photographic and written documentation of these activities. Field logbook documentation was prepared in accordance with the sampling and analysis plan (SulTRAC 2019c). Appendix C contains weekly reports, which include photographic documentation logs, and Appendix D includes the field logbook notes.

3.2.1 Soil Excavation

The following sections discuss soil excavation procedures, as well as the volume and extent of excavation by area.

3.2.1.1 Soil Excavation Procedures

Soil excavation began in the southwestern corner of Area A on July 19, 2019. SulTRAC's subcontractor TriEco conducted the excavation activities using a Deere 135G excavator or equivalent. During excavation, SAHCI screened the soil using a 2x2 sodium iodide (NaI) detector (Ludlum Model 44-10) coupled with a scaler/rate meter (Ludlum Model 2221) to detect gamma activity in counts per minute (cpm) to delineate clean overburden and radium-226-contaminated soil or material. SAHCI performed a regression analysis prior to RA activities to develop instrument-specific field screening levels for each category based on 10,500, and 1,000 pCi/g radium calibration blocks provided by IEMA. The field screening level corresponding to the site's radium-226 concentration RAO was greater than 6.2 pCi/g (6,500 cpm) for the primary 2x2 NaI detector (Ludlum Model 44-10) used at the site presented in the field sampling plan (FSP) (SulTRAC 2019c).

Each detector was equipped with a 6-inch lead collimator shield to reduce the effects of gamma "shine" because of the wide range of radium-226 concentrations on site. Visible spray paint markers were used to allow the excavator operator to distinguish clean overburden material from contaminated material. The excavator removed material in up to 18-inch lifts that were placed into no more than 10 yd^3 piles. SAHCI surveyed each grid cell bottom and sidewall and instructed the excavator operator where to place the lifts of soil into piles by waste category. The soil piles were categorized as either potentially radiologically clean (less than 6,500 cpm) or potentially radiologically contaminated (greater than 6,500 cpm).

After soil was segregated based on field screening, each 10-yd^3 pile was then sampled and analyzed for total radium using the on-site field gamma spectroscopy system in accordance with sampling procedures outlined in the FSP (SulTRAC 2019c).

The material was screened and analyzed as it was excavated to ensure that radium-226-contaminated soil was not mingled with clean material. Once field screened samples were analyzed using on-site field gamma spectroscopy, the10-yd^3 pile was moved to either a clean overburden stockpile (less than 6.2 pCi/g) or the contaminated stockpile (greater than 6.2 pCi/g) on the NPL-8 Landfill. Piles to be added to clean overburden stockpiles were managed directly by a CAT 935B track loader or equivalent. The clean overburden was stockpiled in non-radiologically contaminated areas of the site. The clean overburden stockpiles were covered in plastic to protect from saturation, erosion, and dust generation prior to being used as backfill material.

Piles to be added to the contaminated soil stockpile on the NPL-8 Landfill were placed in a 10-yd^3 dump truck by the excavator and then transported through the exclusion zone to the Landfill. Contaminated soil piles were then managed and added to the contaminated soil stockpile by a CAT 700 track loader or equivalent. Table 1 presents on-site field gamma spectroscopy results for stockpiled contaminated soil piles.

If standing water was encountered within the excavation, an electric submersible 2-inch trash pump was utilized to dewater the excavation. Either in advance or when dewatering was needed, a small area was excavated to a depth of 1 to 2 feet below the excavation bottom and filled with CA1 aggregate to act as a sump and to prevent the pump from getting clogged. The pumped water was directed via a hose to the dewatering pad on the NPL-8 landfill and filtered before onsite discharge. No containment or off-site disposal of water from dewatering activities occurred during the RA.

3.2.1.2 Soil Excavation Extents and Volumes

The specific excavation activities for each area or hot spot, including the extent and volume of excavated material, are discussed chronologically below. Figure 7 shows the proposed excavation extent from the RD (SulTRAC 2019a) compared to the actual extent of excavation. Figure 8 shows the final excavation depths. Table 2 presents the estimated RD volumes, final excavation volumes, and variance for each excavation area.

During the RA, soil containing radium-226 concentrations greater than 6.2 pCi/g was transferred to and stockpiled on the NPL-8 Landfill. Overall, the footprint of areas of contamination expanded beyond initial estimates; however, based on the more shallow depth of contamination than anticipated, the volume of contaminated soil excavated was below the original RD estimate of 4,289 yd^3. A total of 2,462 yd^3 of soil containing radium-226 concentrations greater than 6.2 pCi/g was excavated and transferred to the NPL-8 Landfill. Approximately 2,348 $yd^3$of contaminated soil was excavated from the NPL-8 Frontage Property and ROW area, and 115 yd^3 were excavated from the adjacent Bill Walsh property area.

Area A

Excavation of Area A began on July 19, 2019 and was completed on July 26, 2019. The horizontal extent of excavation of radium-226 contaminated soil from Area A increased from the proposed 1,742 square-foot (ft^2) horizontal extent to 3,989 ft^2. The proposed depth of excavation for Area A increased from up to 3 feet bgs in the RD to 3 to 4 feet bgs. The final excavation volume of Area A was 452 yd^3 which was 26 percent of the design volume (1,729 yd^3). Of the total soil volume, 356 yd^3 contained radium-226 concentrations meeting the RAO and 97 yd^3 contained radium-226 concentrations exceeding the RAO. Minimal debris and only one private utility, an old groundwater well with an associated electrical line, were encountered during the Area A excavation. Additionally, excavation activities in Area A were conducted around five permanent groundwater monitoring wells installed to monitor a leaking underground storage tank (LUST) incident; associated USTs had been removed from the property.

Area G1

Excavation of Area G1 began and was completed on July 26, 2019. The excavation extent of radium-226 contaminated soil from Area G increased from the proposed 181 ft^2 horizontal extent to 247 ft^2. The proposed depth of excavation for Area G1 was up to 3 feet bgs in the RD, but the final excavation depth was 1-foot bgs. The final excavation volume of Area G1 was 12 yd^3, which was 3 percent of the design volume (377 yd^3). Of the total volume, all 12 yd^3 met the RAO. Minimal debris and no utilities were encountered during the Area G1 excavation.

Area B

Excavation of Area B began on July 29, 2019 and was completed on November 18, 2019. Excavation of Area B was intermittent, other excavations began and were completed within this timeframe. Excavation of radium-226-contaminated soil from Area B expanded from the proposed 12,583 ft^2 horizontal extent to 22,209 ft^2. The proposed depth of excavation for Area B was up to 6 feet bgs in the RD (SulTRAC

2019a). The final excavation depth ranged from 0.5 to 5 feet bgs. The final excavation volume of Area B was 1,599 yd^3, which was 56 percent of the design volume (2,874 yd^3). Of the total volume, 1,013 yd^3 met the RAO and 586 yd^3 exceeded the RAO. Minimal debris and only one private utility, an electrical line from the GRE building to the GRE entrance gate , were encountered during the Area B excavation.

Area HS-3

Excavation of Area HS-3 began on August 2, 2019 and was completed on August 5, 2019. Excavation of radium-226 contaminated soil from Area HS-3 increased from the proposed 592 ft^2 horizontal extent to 1,002 ft^2. The proposed depth of excavation for Area HS-3 was up to 3 feet bgs in the RD and the final excavation depth ranged from 2 to 4 feet bgs. The final excavation volume of Area HS-3 was 50 yd^3, which was 5 percent of the design volume (991 yd^3). Of the total volume, 31 yd^3 met the RAO and 19 yd^3 exceeded the RAO. Minimal debris and no utilities were encountered during the Area HS-3 excavation.

Area HS-1

Excavation of Area HS-1 began and was completed on August 5, 2019. Excavation of radium-226 contaminated soil from Area HS-1 increased from the proposed 126 ft^2 horizontal extent to 217 ft^2. The proposed depth of excavation for Area HS-1 was up to 3 feet bgs of the design depth and the final excavation depth ranged from 1 to 2 feet bgs, as shown on Figure 8. The final excavation volume of Area HS-1 was 30 yd^3, which was 11 percent of the design volume (282 yd^3). Of the total volume, 23 yd^3 met the RAO and 6 yd^3 exceeded the RAO. Minimal debris and no utilities were encountered during the Area HS-1 excavation.

Areas G3 and G4

Excavation of Areas G3 and G4 began on August 6, 2019 and was completed on August 16, 2019. Excavation of radium-226 contaminated soil from Area G3 and G4 expanded from the proposed 545 ft^2 horizontal extent to 3,668 ft^2 . The proposed design depth of excavation for Area G3 and G4 was up to 3 feet bgs. The final excavation depth ranged from 2 to 5 feet bgs. The final excavation volume of Area G3 and G4 was 297 yd^3, which was 57 percent of the design volume (518 yd^3). Of the total volume, 154 yd^3 met the RAO and 141 yd^3 exceeded the RAO. Minimal debris and only one private utility, an electrical line from the GRE building to the GRE entrance gate, were encountered during the Area G3 and G4 excavation.

Area G5

Excavation of Area G5 began and was completed on August 7, 2019. The area of excavation horizontal was 581 ft^2, less than the proposed design extent of 585 ft^2. The design depth of excavation for Area G5 was up to 3 feet bgs, with the final excavation depth of 1 to 2 feet bgs. The final excavation volume of Area G5 was 39 yd^3 which was 6 percent of the design volume (607 yd^3). Of the total volume, all 39 yd^3 met the RAO. No utilities were encountered while excavating Area G5. When excavation in this area was completed, gamma survey results indicated a range from 4,000 to 5,000 cpm. A small test pit was excavated because of the observed fill material mixed with clay at 2 feet bgs and the historical gamma survey indicating 10,000 cpm at this location. At about 7 feet bgs, additional fill material consisting primarily of scrap tires was encountered; however, the survey results were 6,000 cpm or below. Therefore, the test pit within G5 was backfilled and the G5 excavation was deemed complete. Based on the results of the supplemental investigation activities discussed in Section 4.2.3, this fill material may have been associated with Area C.

Area HS-2

Excavation of Area HS-2 began on August 8, 2019 and was completed on November 12, 2019. Excavation of Area HS-2 was intermittent, and other excavations were started or completed within this timeframe. The excavation of radium-226 contaminated soil from Area HS-2 expanded from the proposed 311 ft^2 horizontal extent to 1,243 ft^2. The design depth of excavation for Area HS-2 was up to 3 feet bgs; the final excavation depth ranged from 2 to 7 feet bgs. The final excavation volume of Area HS-2 was 344 yd^3 which was 64 percent of the design volume (541 yd^3). Of the total volume, 174 yd^3 met the RAO and 170 yd^3 exceeded the RAO.

Minimal debris was encountered while excavating Area HS-2. However, numerous utilities were encountered as this excavation area was located within a utility corridor for the City of Ottawa. Identified utilities included an AT&T communications line, an electrical line, and three fiber optic lines owned respectively by AT&T, Illinois Fiber, and MediaCom. SulTRAC also confirmed with Nicor Gas that an active 12-inch high-pressure gas main (see Figure 2) and a presumed inactive 10-inch gas main were present. SulTRAC was informed by Nicor Gas to treat the 10-inch gas main as active as they had no information regarding abandonment. Nicor Gas was on site for a “Watch and Protect” of the gas main and service lines during excavation activities in the utility corridor. Three service lines were connected to the 12-inch high-pressure gas main within the area of excavation activities. Two of these service lines were associated with property buildings across SR 71 and one was associated with the GRE property building.

Area D

Excavation of Area D excavation began on September 11, 2019 and was completed on October 22, 2019. The excavation area of radium-226 contaminated soil from Area D increased from the proposed 1,401 ft^2 horizontal extent to 8,066 ft^2. The design depth of excavation for Area D was up to 8 feet bgs with the final excavation depth ranging from 3 feet bgs along the landfill fence line to 13 feet bgs at its deepest point. The final excavation volume of Area D was 1,967 yd^3, which was 248 percent of the design volume (793 yd^3). Of the total volume, 1,039 yd^3 met the RAO and 928 yd^3 exceeded the RAO.

Miscellaneous debris, such as concrete pieces, metal, glass, asphalt, and tires were encountered during Area D excavation. Debris from approximately 0 to 6 feet bgs was primarily comprised of construction and demolition debris, such as concrete and asphalt with tire and metal debris. Debris from approximately 6 to 12 feet bgs was primarily comprised of older building debris, such as brick and metal with glass. Native clay was encountered at approximately 12 feet bgs. Concrete excavated from Area D was assumed to be below the radiological screening criteria if it was within the construction and demolition debris radiologically clean overburden. All concrete excavated from the radium-226 contaminated fill material in Area D was broken into manageable pieces using an excavator. Concrete pieces were screened in accordance with established field screening procedures (SulTRAC 2019c). Clean concrete pieces were stockpiled separately from clean overburden backfill stockpiles and were utilized at the bottom of the Area D excavation along with CA1 as bridging material for further backfill compaction. Contaminated concrete was transported to the contaminated soil stockpile on the NPL-8 Landfill.

Additionally during excavation of Area D, a large cottonwood tree required removal as it was growing within radium-226 contaminated soil and fill material. The Tree Guy (a TriEco subcontractor) crew removed the cottonwood tree from the vicinity of the Area D excavation. The Tree Guy crew felled the tree trunks in the direction they were leaning, cut the trunks into approximately 4-foot sections, and placed the sections of trunk to the right of the gravel haul road on the NPL-8 Landfill. The sections of trunk were transported to the landfill area utilizing a rubber-tired skid steer. The smaller sections of tree limbs were chipped and spread on the NPL-8 Landfill along the fence utilizing a chipper. The stump was then removed by TriEco and also placed on the NPL-8 Landfill.

Area HS-4

Excavation of Area HS-4 began on October 28, 2019 and was completed on November 25, 2019. Excavation of Area HS-4 was intermittent, and other excavations were completed within this timeframe. The excavation area expanded from the proposed 1,236 ft^2 horizontal extent to 4,261 ft^2. The design depth of excavation was up to 3 feet bgs and the final excavation depth ranged from 2 to 6 feet bgs. The final excavation volume of Area HS-4 was 303 yd^3, which was 37 percent of the design volume (811 yd^3). Of the total volume, 60 yd^3 met the RAO and 242 yd^3 exceeded the RAO.

Spring 2020 ROW Excavation

Excavation of the ROW began on May 4, 2020 and was completed on May 26, 2020. The excavation area within the ROW expanded from the design area of 3,211 ft^2 to 7,524 ft^2. The estimated depth of excavation for the ROW was 2 to 4 feet bgs based on the ROW test pit investigation discussed in Section 3.2.3.3. The final excavation depth ranged from 1 to 5 feet bgs. The final excavation volume was 358 yd^3, which was 72 percent of the estimated volume (494 yd^3). Of the total volume, 200 yd^3 met the RAO and 158 yd^3 exceeded the RAO.

Bill Walsh Property

Excavation of the Bill Walsh property began on June 12, 2020, and was completed on June 18, 2020. No estimates of the horizontal or vertical extent, or volume were developed as part of the RD prior to excavation of the Bill Walsh property. The horizontal extent of excavation of radium-226 contaminated soil from the Bill Walsh property was 1,307 ft^2. The final excavation depth ranged from 2 to 7 feet bgs. The final excavation volume of the Bill Walsh property was 120 yd^3. Of the total volume, 5 yd^3 met the RAO and 115 yd^3 exceeded the RAO. While excavating around the electrical utility pole, the electrical utility contractor (Ameren) mobilized to the site to provide a grapple truck to support the electrical utility pole. This grapple truck was removed following backfill of the Bill Walsh property excavation.

Minimal debris was encountered while excavating Area HS-4, the ROW, and the Bill Walsh property. However, numerous utilities were encountered as this excavation area was located within a utility corridor for the City of Ottawa. Excavation within this area encountered the same utilities as those described above associated with HS-2. However, excavation activities in the ROW and the Bill Walsh property did not encounter the inactive 10-inch gas main as it was confirmed to be abandoned and the capped end was discovered within the HS-4 excavation. Nicor Gas remained on site for a “Watch and Protect” of the gas main and service lines during excavation activities in the utility corridor.

3.2.2 Post-Excavation Radiation Survey and Verification Sampling

Prior to RA activities, SulTRAC developed a 10-meter by 10-meter (33-foot by 33-foot) grid over the NPL-8 site, as depicted on Figure 6. This grid was developed to track excavation progress and to set pre-defined areas for verification sample collection. After excavation was completed and before the excavation areas were backfilled, SulTRAC and SAHCI personnel conducted a final status survey consisting of surface radiation surveys and verification sampling from the bottom and sidewalls of the excavated area. Surface radiation surveys were performed to measure gamma radiation levels near the surface of the excavation and side walls. The verification sampling was conducted to confirm that radium-226 levels were below the RAO of 6.2 pCi/g.

The surface radiation surveys began on August 2, 2019, within the Area A excavation, and were completed on June 18, 2020, within the Bill Walsh property excavation. The surveys were completed by surveying in straight lines approximately 3 feet apart over the grid-line system. Measurements were obtained using a 2x2 NaI detector (Ludlum Model 44-10) coupled with a scaler/rate meter (Ludlum Model 2221) and a global positioning system (GPS) unit (Trimble Geo 7X Series unit equipped with a TSC1 Data Logger). Readings were taken with the detector at ground level and were recorded at an interval of one reading per second, along with the corresponding GPS data. Readings were also taken along the sidewalls, however, only radiation readings were recorded from the sidewalls because GPS data could not be collected. Figure 9 illustrates post-excavation gamma walkover survey results.

During the Area A wall surveys, elevated gamma activity (greater than 6,500 cpm) was detected along the A0 and B0 grid walls adjacent to the Bill Walsh property fence line. Gamma activity ranged from 6,000 to 7,900 cpm. On August 30, 2019, over-excavation was conducted but elevated gamma activity remained. Since over-excavation did not reduce the gamma activity, SulTRAC collected a 5-point composite sample from this portion of the A0 and B0 wall as well as one discrete wall sample from the area of the highest identified gamma activity. These samples were analyzed by the on-site laboratory using field gamma spectroscopy. The composite sample result was 3.97 pCi/g and the discrete sample result was 4.5 pCi/g for total radium. With both sample results below the site-specific radium-226 RAO (6.2 pCi/g), excavation in this area was determined to be complete.

The verification sampling began on July 30, 2019, within excavation Area A, and was completed on June 18, 2020, within the Bill Walsh property excavation. The verification sample for each 10-meter by 10-meter grid cell was composed of five sample aliquots, with one sample aliquot from the center of each 20-square-meter portion of the grid. Sample aliquots were collected from as close as possible to the center

of each 20-square-meter portion for partially excavated grids. The sample aliquots were generally composited and homogenized into a single verification sample. However, samples were comprised of less aliquots (a minimum of two) or collected from combined grids when the total excavated area was less than 100 square meters. Combined verification samples were collected from grids B4 and B5, T3 and T4, P3 and P4, as well as D6 and D7.

All homogenized verification samples were split into two separate aliquots; 100 milliliters (mL) of the verification sample was submitted to the on-site field laboratory for preliminary gamma spectroscopy analysis of total radium. The remaining 500 mL collected was submitted to GEL Laboratories for analysis of radium-226 and radium-228 to confirm that any radium-226 exceeding the RAO had been removed. A total of 83 verification samples were collected from the site, including nine duplicate samples. Figure 10 shows the locations of all verification samples. All off-site analytical results for the verification samples were below the RAO (6.2 pCi/g). Table 3 and Figure 11 present verification soil sample results.

Although areas of elevated surface radiation survey readings (greater than 6,500 cpm) were observed within certain excavation areas, final soil verification results for all sampled grids were below the site-specific RAO. However, in some cases concentrations of radium-226 above the site-specific RAO remained within excavation sidewalls. Instances include excavation sidewalls along the NPL-8 Landfill fence line, sidewalls along Area C, and the southwest excavation sidewall of the Bill Walsh property excavation. No verification samples were collected from grids Q5 and R5 in Area D because of radium-226 contamination within adjacent excavation sidewalls. These instances are further discussed below.

3.2.3 Supplemental Investigations

Supplemental investigations were necessary during the RA to evaluate the extent of remaining radium-226 contamination. The findings from these supplemental investigations were either (1) for record documentation purposes, or (2) used to estimate the extent of further excavation necessary under the scope of work for this RA.

SulTRAC conducted three types of supplemental investigations during the RA, which included contaminated excavation wall surveys and sampling, soil boring sampling, and test pitting. These supplemental investigations are discussed in the following sections by investigation type.

3.2.3.1 Contaminated Excavation Wall Surveys and Sampling

Within excavation Areas A, B, D, G3, G4, HS-3, and the Bill Walsh property excavation, elevated gamma survey readings (above 6,500 cpm) remained in the excavation walls along the NPL-8 Landfill or Area C boundaries, and on the Bill Walsh property. However, the excavation floors were verified as clean except as discussed in Section 3.2.2. Further excavation into the NPL-8 Landfill, Area C, or the Bill Walsh property were not a part of the original scope of work for this RA; therefore, no additional excavation was conducted. However, prior to backfilling these areas, additional investigation was conducted to investigate the excavation walls. Specifically, a detailed wall survey was first conducted using a 2x2 NaI detector (Ludlum Model 44-10) coupled with a scaler/rate meter (Ludlum Model 2221). SulTRAC then collected discrete and composite wall samples as needed to supplement the wall survey data. Where radium-226 contamination was identified to remain in place along an excavation wall, orange geofabric was placed as a visual demarcation barrier for potential future RA activities. Figures 12A through 12F present gamma survey and soil sampling results.

In one instance, elevated gamma survey readings resulted in excavation onto the Bill Walsh property. This occurred on the southwest wall during the Spring 2020 ROW excavation, which was adjacent to the Bill Walsh property line in grid A'6. A wall survey was conducted by SAHCI on May 26, 2019, with gamma activity up to 19,000 cpm at the bottom center of the wall. SulTRAC collected a discrete sample from the location of highest gamma activity and a composite sample for field gamma spectroscopy analysis. The sample result for the discrete sample was 95.03 pCi/g, exceeding the RAO, and the composite sample was 5.74 pCi/g. After discussions with EPA, IEMA, and the property owner, an access agreement was obtained and excavation of the Bill Walsh property was conducted up to the asphalt entrance driveway. Figure 12G presents the Bill Walsh property results.

3.2.3.2 Soil Boring Investigations

SulTRAC conducted two soil boring investigations during the RA, one was conducted within the ROW and another was conducted on the Bill Walsh property adjacent to NPL-8. These soil boring investigations included downhole gamma logging, sample collection, and field gamma spectroscopy analysis of samples. All soil boring locations were GPS located with a Global Navigation Satellite System (GNSS) receiver. Detailed discussion of these investigations is provided below.

ROW Investigation

On August 9, 2019, SulTRAC observed contamination at the bottom (approximately 8 feet bgs) and along the northwest and southeast walls (about 7.5 feet bgs) of the Area HS-2 excavation. Soil samples for field gamma spectroscopy analysis samples were collected from the excavation floor (12,500 cpm and 33.44 pCi/g at 8 feet bgs), the wall of the excavation under the AT&T fiber optic line (7,700 cpm and 11.92 pCi/g at 7.5 feet bgs), and the wall of the excavation under the Nicor Gas 12-inch gas main (7,500 cpm and 11.33 pCi/g at 7.5 feet bgs). Excavation activities did not extend deeper in this area because benching and sloping could not be safely conducted with utilities in the area. Additionally, excavation under the fiber optic line or gas main was not feasible without extensive engineering controls in place to prevent undermining the utilities.

Radium-226 contamination extended beyond the RD proposed Area HS-2 excavation area into the ROW. SulTRAC determined additional investigation was necessary to assist in guiding the remaining RA activities in the ROW by (1) obtaining additional information regarding the depth of contamination and (2) determining the lateral extent of contamination between Areas HS-2 and HS-4. From September 11 through 13, 2019, SulTRAC conducted a supplemental soil boring investigation with downhole gamma logging and sampling activities within the ROW. This supplemental ROW investigation revealed that contamination did not extend significantly beyond HS-4 to the southwest and that the depth of contamination was 0-2 feet bgs with the exception of SB-10 with contamination to 8 feet bgs. Figure 13 presents the specific boring locations, sample depths, downhole gamma logging results, and the on-site laboratory results (SulTRAC 2019d).

Bill Walsh Property Investigation

On June 19, 2020, SAHCI conducted an additional gamma surface survey to further evaluate the contamination along the southwest wall of the Bill Walsh property excavation in grids C'5 and C'6. This wall was adjacent to the Bill Walsh property asphalt driveway entrance and the furthest extent of excavation on the Bill Walsh property per the RD scope. SAHCI completed a detailed wall survey with the highest gamma activity of 24,400 cpm detected toward the center of the wall. SulTRAC also collected one five-point composite wall sample prior to the wall survey for analysis by the on-site laboratory; this sample result was 7.60 pCi/g. After the wall survey, SulTRAC collected a discrete wall sample from the location with the highest gamma activity for analysis by the on-site laboratory; this sample result was 116 pCi/g, above the RAO. Figure 12H presents the results of this survey.

On August 4, 2020, SulTRAC and SAHCI also performed a gamma walkover survey on the Bill Walsh property to assist in determining the extent of remaining radium-226 contamination. This survey did not indicate any radiation counts above 6,500 cpm (see Figure 16).

A supplemental soil boring investigation of the Bill Walsh property was conducted on December 9, 2020. The soil boring investigation results indicated that radium-226 contamination above the RAO extended laterally approximately 100 feet southwest from the contamination along the southwest sidewall of the Bill Walsh property excavation and aligned laterally with the northwest and southeast contamination extent encountered during the Bill Walsh property excavation. The depth of contamination above the RAO ranged to a depth of 2.5 to 3.5 feet bgs, becoming shallower to the southwest. Based on these results, contamination also appeared to be limited to the area beneath the currently asphalt-paved driveway. Figure 17 presents Bill Walsh property results (SulTRAC 2020).

3.2.3.3 Test Pitting

SulTRAC conducted two test pitting investigations during the RA, one was conducted within the ROW and another was conducted in the vicinity of Areas C and D. These test pit investigations included geological logging, soil surveys, and sample collection in 2-foot depth intervals; samples were analyzed by field gamma spectroscopy. All test pit locations were recorded using GPS with a handheld GNSS receiver. Detailed discussions of these investigations are provided below.

ROW Test Pitting

On November 5, 2019, the southwestern wall of the 2019 ROW excavation was surveyed and remaining radium-226 contamination was identified. SulTRAC directed the advancement of a test pit 20 feet to the southwest of this southwestern wall. Gamma activity readings of 7,000 cpm at 1ft bgs indicated radium-226 contamination extended further southwest along the ROW. During the excavation surface gamma walkover survey conducted on November 19, 2019, elevated gamma activity (above 6,500 cpm) and radium226 contamination with concentrations exceeding the RAO were also identified along the southwestern-most excavation wall, which resulted in an expansion of Area HS-4.

On December 16, 2019, a supplemental test pit investigation was conducted in the ROW because of the elevated gamma activity and likely radium-226 contamination extending further southwest in the ROW. Test pitting was conducted to delineate the lateral and vertical extent of additional ROW excavation activities under the scope of the RA. A total of nine shallow test pits about 4 feet in depth were excavated

southwest of Area HS-4 in the ROW. All excavated material was placed back in the same excavation at the depths from which it was removed. Radium-226 contamination ranging from 6.64 to 15.46 pCi/g from the surface to 4 feet bgs was detected in test pits 1 (TP-01), TP-03, TP-04, and TP-06. Radium-226 contamination of 13.35 pCi/g from the surface to 2 feet bgs was detected in Test Pit 8. Figure 15 presents test pit gamma survey and on-site gamma spectroscopy results.

Area C Test Pitting

As discussed in Section 3.2.1.2, the extent of contamination in Area D expanded significantly from the design. Residual radium-226 contamination was documented on the southeastern wall of Area D, which is shown on Figure 12F. Since this contamination was not identified as part of Area C, SulTRAC determined that the actual horizontal and vertical extents of Area C likely also varied from what was anticipated based on the RI. On October 16, 2019, one investigative test pit was excavated to 11 feet to the southwest of the temporary fencing surrounding Area D and adjacent to the northwest edge of Area C labeled Test Pit (TP)-01. TP-01 was excavated, surveyed, and sampled in 2-foot intervals to a depth of 17 feet. The depth of overburden was approximately 6 feet bgs and fill material was identified from 6 to 16 feet bgs. Contamination was detected from 4 to 17 feet bgs (see Figure 14). Clay was encountered from 16 to 17 feet bgs and was also found to be contaminated. Additional excavation was not possible as this was the maximum depth of excavation possible. Water was also identified in the bottom of the excavation. The excavation was backfilled immediately following surveying and sampling, and material was replaced at the same depth as excavated. This confirmed the horizontal and vertical extent of Area C contamination varied from what was anticipated. As a result additional investigation was recommended.

On May 27, 2020, SulTRAC began a more comprehensive supplemental investigation with test pitting in the vicinity of Area C which was completed on June 4, 2020. The investigation focused on delineating the extent of contamination around Area C. This supplemental investigation included 16 test pits ranging in depths from 16 to 18 feet bgs following the same procedures as TP-01. Contamination extended laterally southeast to the berm on the Frontage Property parallel to the ROW and northeast up to test pit 16, which was found to be radiologically clean. Contamination depths ranged from 2 feet up to 17 feet bgs (see Figure 14).

SulTRAC used this data to revise the likely extent of Area C, as depicted including the with maximum contamination depths and concentration range. The data could be used for future RA activities, including maximum excavation extents, new volume estimates for excavation, and contamination contour modeling.

3.2.4 Backfill of Excavation Areas

After verification sampling confirmed that the RAO was met, the excavation areas were backfilled. Backfilling of Frontage Property excavation areas was conducted by first bridging the excavation surface with radiologically clean concrete or construction aggregate (CA)1 limestone, as needed. A total of 369.32 tons of CA-1 limestone was utilized as bridging material within the Frontage Property excavation areas. The ROW and Bill Walsh property excavations did not require bridging materials. A total of 3,108 yd^3 of stockpiled clean overburden was then used as backfill and compacted, per RD specifications, for testing across the site (SulTRAC 2019a). Saturated backfill soil was first mixed with drying agent prior to backfill and compaction. A total of 10 tons of calciment and 338.81 tons of bulk lime were used as drying agents between mixing within both the clean overburden stockpile soil and contaminated stockpile material staged on the NPL-8 Landfill. Midwest Testing Services, Inc. (MTS), a third-party construction quality assurance agent (CQA), verified each compacted lift of the clean overburden soil used as backfill on-site.

Once there was no longer any on-site clean overburden available for backfill, clean clay provided by the City of Ottawa was used. A total of 1,543 yd^3 of City of Ottawa clay backfill was utilized. This material was provided in accordance with the in-kind services provisions of the 2010 Consent Decree between the City of Ottawa and the U.S. Department of Justice regarding the ORA Superfund Site (U.S. Department of Justice 2010). The City of Ottawa backfill was transported to the site from a stockpile located east of the International Titanium Powder facility at 1501 Titanium Drive in Ottawa, Illinois. The City of Ottawa backfill was previously evaluated by SulTRAC and determined to meet design specifications (SulTRAC 2019a). Compaction testing was conducted after each 12-inch lift of fill placed in the Area A excavation. MTS, a third-party CQA, verified each compacted lift of the City of Ottawa clay backfill.

The Frontage Property, ROW, and Bill Walsh property excavation areas were similarly backfilled, compacted, and graded to 6 inches below original grade prior to site restoration activities discussed in Section 4.4. Table 4 presents backfill quantities.

3.2.5 Post-Backfill Radiation Surveys of Excavation Areas

Following the completion of backfill activities in 2019, which included the Frontage Property excavation areas and ROW excavation areas HS-2 and HS-4, SulTRAC and SAHCI conducted final surface gamma radiation surveys. These surveys began on December 18, 2019, in Area D, and were completed on December 23, 2019, in the support zone.

In addition, following the completion of backfill activities of the ROW and Bill Walsh property excavations in 2020, SulTRAC and SAHCI conducted final surface radiation walkover surveys. These surveys began on June 10, 2020, in the supplemental test pit area in the vicinity of Area C that was not surveyed in 2019, and were completed on August 14, 2020, in the support zone.

The surveys were completed by surveying in straight lines approximately 3 feet apart over the established grid-line system. Measurements were obtained using the same equipment as the excavation floor surveys, a 2x2 NaI detector coupled with a scaler/rate meter and a GPS unit with a data logger. Readings were taken with the detector at ground level and were recorded at an interval of one reading per second, along with the corresponding GPS data. Figure 18 presents the post-backfill final gamma walkover results.

3.2.6 Contaminated Soil Stockpile Cap Construction

Contaminated soil stockpiling and capping was completed in accordance with RD specifications within the landfill area of NPL-8 (SulTRAC 2019a). The contaminated soil stockpile cap is a low-permeability cap and was constructed in accordance with Title 35 of the Illinois Administrative Code Part 811 requirements.

Compaction of the contaminated soil stockpile was completed in accordance with results of a compaction test by TriEco on September 6, 2019. A surveyor (Renwick and Associates) and CQA (MTS) were on site to assist with conducting a compaction test of the stockpiled contaminated soil on the NPL-8 Landfill. Prior to the compaction test, TriEco's subcontractor M-2 compacted the current grade and placed orange demarcation fabric. The compaction test pad was placed over orange demarcation fabric and measured 40 feet by 15 feet; the width was approximately four times the width of the vibratory sheepsfoot compactor. The test pad length was split into four 10-foot sections and the test pad width was split into three 5-foot sections. The surveyor evenly spaced six points within the test pad on the corners of the sections to survey elevation change after each pass. The CQA also tested the compaction after each pass. It was determined that a total of six passes, or three passes forward and back, would be sufficient to compact stockpiled contaminated soil. Attachment 1 includes compaction test results.

SulTRAC's project engineer was on site during the final contaminated soil stockpile grading and the cap construction to determine compliance with the RD specifications. The only deviations were: (1) the final size of the stockpile was less than the design size as the soil volume of 2,462 yd^3 was less than the design estimate of 4,289 yd^3; and (2) an alternative liner product specification was proposed by SulTRAC's subcontractor TriEco and reviewed and approved by SulTRAC's project engineer.

The liner product change was made because of long lead delivery times on bonded geosynthetic clay liner (GCL) from the originally proposed manufacturer. The alternative products were proposed on June 2, 2020, and product clarifications were provided to SulTRAC via email on June 3, and June 10, 2020. Attachment 6 includes product data of the liner materials.

The following products were accepted for the stockpile cap construction:

- Agru GeoClay WN36 – needle-punched GCL
- MicroSpike – High-density polyethylene liner (HDPE) - 30 mil, textured on both sides
- Agru – Geocomposite 250 mil, double sided

On June 19, 2020, the final excavated contaminated soil was transferred to the contaminated soil stockpile on the NPL-8 Landfill and was compacted. MTS was on site for all contaminated soil stockpile compactions as a third-party CQA to test the lift compactions. A temporary demobilization was conducted while waiting for delivery of liner materials for the cap construction. On July 20, 2020, the liner materials (including 16 rolls of geocomposite, 16 rolls of GCL, and 2 rolls of HDPE) were delivered to the site.

On July 22, 2020, a third-party CQA from Geotechnics inspected the liner materials and the stockpile prior to construction. Hallaton was subcontracted by TriEco to complete the contaminated soil stockpile construction and the crew received site-specific radiation training. The contaminated soil stockpile capping activities began on July 20, 2020, and were completed on August 14, 2020. Construction consisted of the following:

- Excavating an anchor trench around the contaminated soil stockpile.
- Removing protruding debris from the surface of the stockpile prior to grading and smooth rolling the compacted contaminated soil surface.
- Importing clay backfill for the stockpile cap from the City of Ottawa stockpile to the site to fill and grade low spots identified on the stockpile by Hallaton prior to liner installation.
- Hallaton accepting the subgrade prior to laying out the GCL and HDPE and placing bentonite on GCL panel seams and placing HDPE overtop.
- Placing and seaming of the HDPE layer and installing the HDPE rain flap at the foot of the stockpile.
- Backfilling the anchor trench and placing clay under the HDPE rain flap.
- Placing and seaming the HDPE rain flap.
- Conducting QA/QC pressure tests to verify the integrity of the HDPE seams to ensure no leaks were present.
- Installing the geocomposite drainage layer.

- Importing additional clay backfill from the City of Ottawa stockpile for grading and compacting of the freeze-thaw cap over the constructed contaminated soil stockpile.
- Importing pea gravel to be placed around the toe of the stockpile and end of the HDPE rain flap to facilitate drainage.
- Importing and grading of a 6-inch layer of topsoil over compacted clay as part of the freeze-thaw cap.
- Seeding with Class 3 Northern Illinois Slope Mixture over the graded topsoil.
- Placing an erosion control straw blanket on the seeded topsoil of the freeze-thaw cap over the constructed contaminated soil stockpile.

The liner materials were installed in accordance with the manufacturer's installation instructions, the construction specifications, and the Remedial Design. Figure 19 provides the compacted contaminated soil stockpile contours for both pre-cap installation and post-cap installation. SulTRAC conducted post-RA site inspections to ensure no corrective actions were required following completion of the constructed contaminated soil stockpile. Section 6.0 includes further details regarding post-RA site inspections.

3.2.7 Additional Radiation Surveys

In addition to the post-backfill radiation surveys of excavation areas, SulTRAC and SAHCI completed gamma walkover surveys of the contaminated soil stockpile as well as on the Bill Walsh property.

On July 13, 2020, a gamma walkover survey was conducted of the uncapped compacted contaminated soil stockpile to provide reference of the conditions prior to capping. On August 5, 2020, a gamma walkover survey was conducted of the capped constructed contaminated soil stockpile to demonstrate cap effectiveness and to provide a reference of the conditions immediately following capping. During the capped stockpile survey, small areas of elevated gamma activity (above 6,500 cpm) were identified near the center of the toe of the northwest and southwest sides of the stockpile; however, this gamma activity was likely the result of shine from the radium-226 contamination at the surface of the NPL-8 Landfill in those areas, and not the stockpiled contaminated material itself. Figure 20 shows the gamma-walkover survey results of the compacted contaminated soil stockpile for both pre-cap installation and post-cap installation.

As a result of the radium-226 contamination possibly remaining beneath the asphalt extending from the southwestern most excavation wall on the Bill Walsh property, SulTRAC and SAHCI completed an investigative gamma walkover survey of the Bill Walsh property on August 4, 2020. The gamma walkover survey extended from the final southwestern extent of the Bill Walsh excavation to the asphalt driveway and parking area into a grass portion of the property approximately 50 feet past the light pole on

the southeast side of the parking lot. The gamma walkover survey also extended approximately 50 feet southeast toward Route 71 and northwest over the grass area surrounded by asphalt and included landscaped areas near the unused Bill Walsh building. Gamma activity greater than 6,500 cpm was not detected. Figure 16 shows the results of the investigative gamma-walkover survey over the Bill Walsh property.

When the RA had been completed, SulTRAC and SAHCI also conducted surface radiation surveys to verify that the portion of the Bill Walsh property, adjacent to the southwest of the Frontage Property used for personnel parking, remained uncontaminated. This gamma walkover survey was completed on August 6, 2020, and gamma activity greater than 6,500 cpm was not detected. Figure 21 presents the results of the gamma-walkover survey over the portion of the Bill Walsh property used for personnel parking.

3.3 WASTE TRANSPORTATION AND DISPOSAL

This section discusses the appropriate approval of waste from the site for transportation and disposal as well as the types of wastes transported off-site for disposal.

No radium-226-contaminated soil was disposed of off-site during these RA activities as all radium-226 contaminated soil was stockpiled on the NPL-8 Landfill and then capped (see Section 4.1.8).

SulTRAC received approval from the U.S. Ecology's Wayne Disposal, Inc. (Wayne Disposal) facility in Belleville, Michigan, for disposal of non-Department of Transportation (DOT) regulated debris in contact with soil containing low concentrations of radium-226. The description within the waste manifests stated "low concentrations of radium-226" and referred to the total radium concentration of 26.5 pCi/g, which was the average concentration of all soil within the constructed contaminated stockpile at the time the waste profile was signed by EPA on May 21, 2020. Only waste that came into contact with soil containing low concentrations of radium-226 was transported for off-site disposal under the approvals documented and described in further detail in this section.

The waste or debris included PPE, plastic, discarded geofabric, silt fence, metal debris, etc. that came into contact with soil containing low concentrations of radium-226.

All shipments of debris to the Wayne Disposal facility were non-regulated quantities of radioactive material in accordance with 49 Code of Federal Regulations (CFR) 173.436. Once approval was obtained, the debris with radium-226-contaminated soil residuals contained in 20 yd^3 roll-off boxes was

transferred by truck to the Wayne Disposal facility. Attachment 2 provides the waste manifests, associated landfill weight tickets, and waste profile documentation.

Each roll-off dumpster containing debris with radium-226-contaminated soil residuals was screened for exterior contamination, prior to release off-site. SAHCI conducted screening of beta/gamma and alpha radiation levels on the exterior of the roll-off dumpsters, which involved using large area wipe samples counted on a Ludlum M2360 count rate meter with a 43-93 scintillation probe. Wipe samples were screened for beta/gamma and alpha contamination. Wipes were used because the area background was too high for direct readings. No detectable counts above background were reported.

A total of 13.49 tons of Non-DOT regulated debris that came into contact with soil containing low concentrations of radium-226 was shipped from NPL-8 to the Wayne Disposal facility. The first was shipped on July 30, 2020, received on July 31, 2020, and totaled 7.46 tons. The second was shipped on August 6, 2020, received on August 7, 2020, and totaled 6.03 tons.

Non-radiologically contaminated debris and general refuse was collected in 10 yd^3 roll-off dumpsters and shipped off site for disposal by Advanced Sanitation. General refuse was shipped off site for disposal twice, on December 18, 2019, and August 14, 2020.

3.4 AIR MONITORING

This section describes perimeter and personal air monitoring conducted as part of the RA at the NPL-8 Frontage Property.

3.4.1 Perimeter Air Monitoring

Particulate air monitoring was performed at the site perimeter in four locations (see Figure 5), two to the south at locations labeled S-1 and S-2, as well as east and west of the excavation area, using a Staplex Model TFIA high-volume air sampler. Air monitoring was performed every workday during excavation unless precipitation or other adverse weather conditions occurred. Samples were collected from the four air monitoring locations of the site after every workday. Perimeter air particulate stations were placed 1 to 1.5 meters above the ground. Samples were analyzed on-site, as described in the sampling and analysis plan using a Ludlum Model 2200 scaler with attached Model 43-10 alpha scintillation detector within 24 hours after they were collected and then were analyzed again 96 hours later. The procedure of analyzing samples at 24 and 96 hours after they were collected was implemented to allow short-lived radon and thorium progeny, which interfered with the sample analysis, to decay over 4 days. Sample results were compared with the radium-226 air effluent limit of 9×10^{-14} microCuries per milliliter (µCi/mL), as

specified in 10 CFR 20, as that is the most restrictive limit of the isotopes present. The final perimeter air monitoring results were below the radium-226 air effluent limits. Figure 5 shows the primary perimeter air monitoring locations, which varied slightly as appropriate based on the location of active excavation areas; Table 5 presents perimeter air monitoring results.

3.4.2 Personal Air Monitoring

Personal lapel sampling equipment was assigned to workers. Gilian Model BDXII low-volume personal air samplers, or equivalent, were used to collect breathing zone air samples during site operations from two workers within the exclusion zone per workday. Air samples were collected in the breathing zone of the site workers within the exclusion zone with the highest potential for exposure to airborne contamination. Samples were analyzed using a Ludlum Model 2200 scaler with attached Model 43-10 alpha scintillation sample counter and compared with the site administrative limit of 10 percent of the derived air concentration (DAC) for radium-226, $3x10^{-11}$ µCi/mL. Detailed procedures for occupational air sampling and calculation of internal doses based on the occupational air sampling data are presented in the sampling and analysis plan (SulTRAC 2019c). Table 6 presents personal air monitoring results.

3.4.3 Particulate Monitoring

Continuous real-time particulate air monitoring was conducted while parcels were being excavated. One TSI DustTrack DRX unit was used for downwind particulate monitoring; data were logged and downloaded from the units daily. The unit was placed downwind of the work being conducted and in close proximity to the area being excavated. The alarm on the unit was set to 2.5 milligrams per cubic meter (mg/m^3) in accordance with SulTRAC's health and safety plan (HASP) (SulTRAC 2019e). The levels measured during the project ranged between 1 and 200 $\mu g/m^3$, all of which were below the action limit. Particulate air monitoring data are presented in Table 7.

3.5 SITE RESTORATION

Site restoration involved locating and abandonment of the buried historical monitoring well MW-64, final grading of backfill, CA-6 finish grading with compaction or topsoil finish grading with seeding and erosion control measures, silt fence removal, fence repair or replacement, and NPL-8 Landfill gate relocation (as requested by IEMA). These restoration activities are described in further detail in this section.

An anticipated restoration activity was the locating and abandonment of monitoring well MW-64. Prior to final grading of the area in the vicinity of the Area D excavation and the Area C test pits, SulTRAC's contractor TriEco excavated in the area where MW-64 was expected to be located based on the location

provided in the RI. The GPS location was identified utilizing a handheld GNSS receiver. The excavation was 8.5 to 9.5 feet wide, 20 feet long, and 8 feet deep. MW-64 could not be located and TriEco backfilled and compacted the excavation. The excavated soil and material were surveyed by SAHCI prior to backfill and gamma activity ranged from 2,900 to 3,500 cpm. Based on subsequent discussions with EPA and IEMA, no further effort to abandon this well was required.

As discussed in Section 4.2.4, the excavation areas within the GRE property were backfilled and compacted to within 6 inches of pre-existing grade (the grade before RA activities began) when excavation was complete.

The Frontage Property excavation areas were finished with CA-6 limestone (gravel). The gravel layer was graded and compacted to allow for proper drainage from the property. A total of 3,063.34 tons of CA-6 was utilized over the Frontage Property as finishing grade. Figure 22 presents the final grade as-built drawing for the Frontage Property.

The ROW and Bill Walsh property excavation areas were backfilled, compacted, and graded to 6 inches below original grade and then finished with topsoil. The topsoil was then seeded with Class 3 Northern Illinois Slope Mixture and covered with straw erosion control blanket to prevent erosion prior to seed establishment and revegetation. The topsoil source was sampled and analytical results were reviewed by SulTRAC prior to backfill approval. Analytical results indicated that the topsoil met TACO Tier 1 remediation objectives for the residential soil exposure route (see Attachment 3). A total of 265 yd^3 of topsoil was spread over 0.33 acre of the site, which included the ROW excavations (HS-2, HS-4, Spring 2020 ROW excavation) and the Bill Walsh property excavation. This area included the excavation limits, as shown on Figure 7.

All areas where existing fencing was removed for access or for excavation activities was replaced or repaired as part of site restoration activities. This included the landfill fencing adjacent to Area D, the fencing between the ROW and Frontage Property Area B, and the fencing opened between the ROW and the Frontage Property for the haul road between the ROW and Bill Walsh excavations and the NPL-8 Landfill. Additionally, as part of restoration activities and per IEMA's request, the NPL-8 Landfill entrance gate accessible from the Frontage Property in Area A was relocated to be accessible from the Bill Walsh property about 10 feet from the Frontage Property boundary (see Figure 22).

Figure 22 presents the final grade as-built drawing for the ROW and Bill Walsh property.

3.6 FINAL DEMOBILIZATION

A full demobilization was completed at NPL-8 after site restoration activities and the final gamma walkover survey conducted on August 14, 2020.

Prior to demobilization of any equipment that came in contact with contaminated soil, it first underwent dry decontamination with rags and brooms to remove excess debris and soil. Once visible soil was removed, wipe samples were collected to verify that the release criteria established in Nuclear Regulatory Commission Regulatory Guide 1.86 were met. If the dry decontaminations was unsuccessful, the RSO advised additional decontamination techniques such as pressure washing. A pressure washer was used to remove excess soil from the larger equipment as necessary.

A scanning survey was completed for all the equipment before it was transported off site. The surveys were conducted with a 2x2 NaI detector (Ludlum 44-10). No activity levels above background were observed during the scanning survey. Clean and wipe survey results are included in the SAHCI data package provided as Attachment 4. The final Post-RA inspection was completed on August 14, 2020 (see Section 6.0).

3.7 GREEN REMEDIATION

SulTRAC incorporated green and sustainable remediation approaches during the NPL-8 RA in accordance with EPA, IEPA, and other relevant guidance, (ASTM International 2016; EPA 2012a, 2012b, and 2016; and IEPA 2008). These approaches included reuse of fill materials, recycling, use of local businesses, use of local staff, saving energy and water, dust mitigation, erosion control, on-site soil sample analysis, and revegetation, as well as associated cost savings discussed below, wherever possible.

As discussed in Section 3.2.4, locally sourced backfill material provided by the City of Ottawa was used to fill the excavation at NPL-8. This backfill was generated during various city construction projects and was stockpiled to the east of Titanium Drive in Ottawa, Illinois, which is about 1 mile from NPL-8. In addition to cost savings realized when the city provided the material, use of the backfill allowed for a beneficial reuse and also reduced the transportation distance—providing additional cost and energy savings as well as reduced carbon emissions—compared with transporting backfill to the site from more distant locations. Furthermore, during excavation, materials were carefully segregated as clean overburden or contaminated materials, and the clean overburden was then reused as backfill.

Concrete debris generated during site excavation found to be radiologically clean was reused as bridging at the bottom of saturated excavation areas. This reduced the total quantity of CA-1 limestone transported

to the site to be used for bridging and eliminated the need to transport the concrete off-site for disposal—providing additional cost and energy savings as well as reduced carbon emissions.

As discussed in Section 2.3, SulTRAC conducted a supplemental investigation prior to RA activities which included the installation of piezometers for collection of groundwater samples. Following review of groundwater sample analytical results, only iron exceeded City of Ottawa sewer discharge standards at concentrations up to 36.5 mg/L (SulTRAC 2019b). These results supported the proposed design of the RA dewatering system that specified filtered discharge over a constructed dewatering pad on the NPL-8 Landfill. As discussed in Section 3.2.1.1, standing water within excavation areas was dewatered by way of a submersible 2-inch trash pump with attached hose. The hose with a filter bag at the end ran from the pump to the dewatering pad on the NPL-8 Landfill.

By sampling groundwater prior to the initiation of RA activities, SulTRAC was able to utilize filtered on-site dewatering. This significantly reduced cost by eliminating the need for discharge water treatment, materials for treatment, discharge water storage, transport, and disposal, all of which provided additional cost and energy savings as well as reduced carbon emissions.

During the RA, temporary soil stockpiles were covered during non-operating hours to limit erosion. Silt fence or straw waddles were installed around all active excavation areas. A stormwater drainage swale was constructed on the southeast side of the constructed contaminated soil stockpile. The swale directs drainage toward the southwest away from the stockpile, where portions of the site had naturally drained before the RA. Additional erosion control measures included the installation of Geoweb over an area of gravel washout along the southeastern Frontage Property fence line. The Geoweb was placed, filled with CA-6 gravel, and the gravel was compacted. Following installation of the Geoweb, no additional gravel washout was observed in this area. Site grading and seeding with an erosion control straw blanket cover were also conducted to prevent soil erosion after NPL-8 RA activities.

During the RA activities, soil was analyzed via on-site field gamma spectroscopy. On-site soil analysis significantly reduced the number of samples shipped off-site for analysis, which reduced resources required for packaging samples and transportation emissions.

Local SulTRAC staff, as well as subcontractor laborers and operators, were utilized throughout the RA. Use of local resources reduced the required travel to and from the site and resulted in a significant reduction in carbon emissions.

Electrical cords were run to all perimeter high-volume air sampling locations from the on-site trailers. This eliminated the need for generators to run high-volume air samplers located on far ends of the site.

Whenever possible, equipment with rechargeable batteries was used, including air monitoring and personal air sampling. These practices resulted in reduction in cost and carbon emissions.

Following completion of the contaminated soil stockpile cap construction, Hallaton personnel returned to the site and collected the remaining unused liner materials. This reduced waste as these liner materials were not disposed of and instead were taken off site to be used by Hallaton on a future cap or during a similar installation.

In addition to the environmental footprint reductions discussed above, the green remediation approaches and activities incorporated into the RA also resulted in notable cost savings. Initially, disposable boot covers were utilized by the site crew for work within the exclusion zone. Use rate was six pairs per day for first 2 weeks costing an average of $183 per week. To reduce waste and future disposal costs, SulTRAC purchased reusable boot covers for the site crew. Disposable boot covers were then only utilized by site visitors and rotational support staff. Use rate dropped to an average of one pair per day costing only $30.50 per week for the remainder of the RA.

Initially, disposable plastic scoops were utilized for excavated soil pile sampling. Over the first 14 days of excavation, 159 plastic scoops were used and disposed of to sample excavated soil piles costing an average of $125 per week. To reduce waste and future disposal costs, SulTRAC purchased reusable steel garden trowels for sampling, which were dry deconned and surveyed as needed for reuse. Plastic scoops were no longer utilized for the remainder of the RA, eliminating this cost.

Utilizing reusable boot covers and steel trowels also provided indirect cost savings of reduction in overall volume of radium-contaminated waste disposal as well as environmentally preferred reduction in overall waste generation.

A water cooler was on site in the site trailer to fill reusable water bottles within the support zone. Approximately three refillable 5-gallon jugs were used every 2 weeks eliminating the use of approximately 57 disposable plastic water bottles every week.

Two recycling containers were located on site, one in the contamination reduction zone and one in the support zone in the site trailer. SulTRAC ensured that any and all plastic bottles, paper, and other recyclable materials were collected and properly recycled off site at either Cimco Recycling or Republic Services in Ottawa.

4.0 CHRONOLOGY OF EVENTS

The schedule below provides a summary of major events or activities and corresponding dates for the RA at NPL-8 Frontage Property.

DATE	EVENT/ACTIVITY
June 27, 2019	Mobilization Begins
July 11, 2019	Site-Specific Radiation Safety Training and RA Project Kick-off Meeting for Key Personnel
July 12, 2019	Mobilization Complete
July 16, 2019	Site Preparation Begins (Support Zone, Silt Fence, Haul Road, Dewatering Pad, Decontamination Pad, Utility Clearance) Clearing and Grubbing of Contaminated Soil Stockpile (Stockpile) Footprint on the NPL-8 Landfill Begins
July 17, 2019	Clearing and Grubbing of Stockpile Footprint on the NPL-8 Landfill Complete
July 18, 2019	Site Preparation Complete
July 19, 2019	Excavation of Area A on the Frontage Property Begins
July 26, 2019	Excavation of Area A on the Frontage Property Complete
July 29, 2019	Excavation of Area B on the Frontage Property Begins
July 30, 2019	Verification of Grids and Sampling for Area A Complete
August 8, 2019	Excavation of Right of Way (ROW) Area HS-2 Begins
September 11, 2019	Excavation of Area D on the Frontage Property Begins
October 22, 2019	Excavation of Area D on the Frontage Property Complete Verification of Grids and Sampling for Area D Complete
October 28, 2019	Excavation of ROW Area HS-4 Begins
November 11, 2019	Excavation of ROW Area HS-4 Complete
November 12, 2019	Excavation of ROW Area HS-2 Complete
November 14, 2019	Verification of Grids and Sampling for HS-2 and HS-4 Complete
November 18, 2019	Excavation of Area B on the Frontage Property Complete Verification of Grids and Sampling for Area B Complete
December 10, 2019	Backfill Activities Complete in Area D and Begins in Area B
December 18, 2019	Backfill Activities Complete in Area B and ROW Areas HS-2 and HS-4
December 18, 2019	Stockpile Construction and Compaction Testing Complete – Covered with Geofabric for Winterization
December 27, 2019	Temporary Winter Demobilization Activities Complete
April 27, 2020	Remobilization for Spring 2020 ROW Excavation Activities Begins
April 29, 2020	Remobilization for Spring 2020 ROW Excavation Activities Complete
May 5, 2020	Spring 2020 ROW Excavation Begins
May 26, 2020	Spring 2020 ROW Excavation Complete Verification of Grids and Sampling for Spring 2020 ROW Complete
May 27, 2020	Area C Investigative Test Pitting Begins
June 4, 2020	Area C Investigative Test Pitting Complete

DATE	EVENT/ACTIVITY
June 12, 2020	Excavation of Bill Walsh Property Begins
June 18, 2020	Excavation of Bill Walsh Property Complete Verification of Grids and Sampling for Bill Walsh Property Complete
June 19, 2020	Spring 2020 ROW Backfill Activities Complete Temporary Demobilization Activities Complete Pending Materials for Liner Installation Over the Stockpile
July 20, 2020	Remobilization for Stockpile Liner and Cap Installation Liner Materials Arrive On Site Stockpile Preparation for Liner Installation Begins
July 22, 2020	Stockpile Preparation for Liner Installation Complete
July 23, 2020	Liner Installation Over the Stockpile Begins
July 25, 2020	Liner Installation Over the Stockpile Complete
July 27, 2020	Cap Installation on Stockpile Begins
July 29, 2020	Pre-Final Inspection Site Walk with EPA and IEMA Complete Agency presence during the subsequent final inspection was determined by EPA and IEMA not to be required) Meeting with Bill Walsh Property Owner for Final Walk Through
August 4, 2020	Cap Installation On Stockpile Complete Seed Spreading Over the ROW and Cap of the Stockpile Complete
August 6, 2020	Erosion Control Straw Blanket in the ROW and Over the Cap of the Stockpile Complete
August 7, 2020	Fencing Repairs Completed and IEMA Landfill Access Gate Moved
August 12, 2020	Meeting and Final Walk Through with Frontage Property Owner
August 14, 2020	Final Inspection Complete Final Site Demobilization

5.0 PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL

This section describes the performance criteria that were established in the RD for the NPL-8 Frontage Property. Specifically, this section describes the rationale of the RA objectives and soil cleanup standards used during this RA.

5.1 RATIONALE OF REMEDIAL ACTION OBJECTIVES

The objective of the RA activities was to remove levels of radium-226 contamination at the site exceeding the RAO of 6.2 pCi/g, in pre-determined excavation and other hot spot areas, to a general maximum depth of 10 feet bgs as described in the ROD (EPA 2004). After the RA for the Frontage Property site, The objective was to reduce exposure risk to human health to the acceptable risk range result from exposure to radium-226-contaminated soil through external contact, ingestion, and inhalation as well as the risk of radon gas inhalation. Applicable or relevant and appropriate requirements (ARAR) were established and met for environmental cleanup actions at the site. Radium-226 is the primary COC listed in the ROD. Organic and inorganic contaminants were not considered COCs. The RAO, or cleanup level, for radium-226 listed in the ROD was used as the primary criterion for the evaluation of analytical results.

5.2 SOIL CLEANUP STANDARDS

The RAO for radium-226 defined in the ROD is 6.2 pCi/g.

5.3 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

Guidelines for the quality assurance and quality control (QA/QC) procedures used throughout the RA are outlined in the quality assurance project plan (QAPP) (SulTRAC 2019c) and the various site-specific management plans prepared by subcontractors or submitted by SulTRAC to EPA. QA/QC and other procedures outlined in the planning documents enabled SulTRAC to determine that results reported are accurate and adequate to ensure satisfactory execution of the RA, in a manner consistent with the requirements of the ROD. The procedures outlined in the plans also ensure that the work would be performed in a manner protective of human health and safety. The relevant site-specific management plans are described below:

1. The TriEco Work Plan outlines TriEco's role and plan to meet requirements during the RA activities, including scope of work, proposed construction sequence and schedule, project personnel, shop drawings and product data, health and safety, site utilization, site preparation, construction quality assurance, site surveys, site excavation, work in ROW, stockpile cap, waste disposal and facilities, site restoration, and demobilization. Attachment 5 includes a copy of the TriEco work plan with the landfill materials protection plan addendum.
2. The TriEco Construction Quality Assurance Plan (CQAP) outlines administrative procedures and controls, including inspection, corrective action, and documentation procedures for construction activities. Attachment 5 includes a copy of the TriEco CQAP.
3. The QAPP (SulTRAC 2019c) describes the sampling procedures, analytical methods and procedures, and data handling and documentation procedures used for obtaining the analytical results required for the RA. This document also outlines the administrative procedures used to ensure proper implementation of this plan.
4. The FSP (SulTRAC 2019c) presents the proposed sampling activities at the site; it also specifies sampling procedures and protocols. The FSP also addresses the sampling numbering procedures, documentation, tracking, and handling.
5. The TriEco Transportation and Disposal Plan provides the guidance and procedures for how the various waste streams associated with the RA would be managed, including off-site transportation and disposal. Attachment 5 includes a copy of the TriEco Transportation and Disposal Plan.
6. The Site Management Plan (SulTRAC 2019f) describes management responsibilities in terms of access, security, disposal of waste, and other procedures to be followed during field activities.
7. The Radiation Protection Plan (RPP) (SulTRAC 2019g) provides guidance for dose limits and monitoring protocols to reduce potential worker and public exposure to radioactive material, including action levels, hazard assessments, and emergency response contingencies.
8. The HASP (SulTRAC 2019e) provides general guidance for on-site safety. Specifically, the HASP provides information regarding safety procedures for use around heavy equipment, environmental hazards (heat stress and severe weather), site control zones, medical surveillance, and health and safety enforcement.

Data validation for SulTRAC off-site laboratory analytical results was conducted in accordance with the QAPP (SulTRAC 2019c) and are provided in Appendix E; SAHCI validation results are included in Attachment 4. The relevant QA/QC documentation for the contaminated soil stockpile construction is provided in the Hallaton data package as Attachment 6.

6.0 INSPECTIONS AND CERTIFICATION

This section describes the inspections and health and safety procedures conducted as part of the final inspection and documentation phase of the NPL-8 Frontage Property RA, as well as certification that the remedy is functional and operational.

6.1 INSPECTIONS

SulTRAC conducted interim site inspections between ongoing RA activities, a pre-final site inspection, and a final site inspection. The details of these site inspections are discussed in this section.

Interim Site Inspections

From January 10, 2020, to April 16, 2020, SulTRAC conducted interim site inspections during the temporary demobilizations between ongoing RA activities. These interim site inspections were conducted, during the temporary demobilization for the winter that began in December 2019. These site inspections were conducted routinely at least once every 2 weeks and after significant weather-related events.

SulTRAC conducted additional interim site inspections from June 23, 2020, to July 16, 2020, during the temporary demobilization pending delivery of liner materials for construction of the contaminated soil stockpile cap. These site inspections were conducted routinely at least once every week and after significant weather-related events.

Appendix F provides site inspections documented with reports and photologs.

Pre-Final Site Inspection

SulTRAC conducted a pre-final site inspection along with representatives of TriEco, EPA, and IEMA on July 29, 2020, when RA activities were substantially complete, including backfill of all excavation areas and the clay freeze-thaw cap over the contaminated soil stockpile. SulTRAC also conducted a pre-final site inspection with the GRE property owner on August 12, 2020. The purpose of these inspections was to review the status of the remediation activities and to ensure the scope of work was fully achieved, as well as to create a punch list of items to be addressed prior to demobilization activities. The property owner requested some minor additional site grading and requested that mulch used in the support zone be placed on the NPL-8 Landfill side of the fence; these items were addressed on August 14, 2020.

Additionally, on July 31, 2020, SulTRAC inspected the City of Ottawa clay pits. SulTRAC observed that the area where TriEco obtained clay backfill resulted in a sheer face cut into the hill. Therefore, SulTRAC directed TriEco to cut the hill back to grade it to a more gradual slope before demobilizing equipment. On August 4, 2020, TriEco completed grading the portion of the City of Ottawa clay borrow pit used for clay import. SulTRAC notified the City of Ottawa that use of the clay pits was complete and the clay face was cut back to a more gradual slope.

Final Site Inspection

SulTRAC and TriEco subcontractor M-2 conducted a final RA inspection on August 14, 2020, and observed that all punch list and other items had been completed. The final post-RA inspection report was distributed to EPA, IEMA, and IEPA on September 2, 2020. Appendix G includes the final site inspection report and punch list.

6.2 HEALTH AND SAFETY

Before site work began, site personnel attended a 2-hour radiation safety orientation on July 11, 2019, to address specific hazards and concerns associated with the site. Additionally, site personnel were required to wear a transparent luminescent detector (TLD) badge to assess any exposure that was generated during excavation. The TLD badges were collected and analyzed after the RA was completed (results are included in Attachment 4). Daily health and safety meetings were held prior to each day of work on the site. Training records for each worker were reviewed and filed before work began at the site, and site personnel were responsible for reviewing the site HASP. Training certificates and daily safety meeting logs are retained with the site files.

6.3 CERTIFICATION

As discussed in Section 4.1.4, analytical results for verification samples collected from the excavation bottom and sidewalls during the RA were below the RAO of 6.2 pCi/g for radium-226. This RAO was defined in the ROD (EPA 2004) and was used as the primary performance standard to assess the sufficiency of the RA activities. Surface radiation surveys performed to measure gamma radiation levels near the surface of the excavation and side walls ensured that previously uncontaminated areas remained uncontaminated further supporting that RA cleanup goals were met. In instances where contamination remained in excavation sidewalls, SulTRAC and SAHCI conducted more comprehensive surveys and collected additional samples, as needed and as discussed in Section 3.2.3.1 to facilitate the design and implementation of future RA activities at the NPL-8 site

In addition to meeting project cleanup goals, the RA was implemented in accordance with the design plans and specifications, unless otherwise approved by EPA or IEMA, and is therefore fully operational and functional. Record drawings documenting existing site conditions, final grade at the site, as well as excavation areas, and stockpile grades are included in Attachment 7.

7.0 OPERATION AND MAINTENANCE

After RA activities were completed, the site was returned to its previous condition. The site remains primarily an active commercial property owned by GRE, which is utilized as a gravel lot for equipment and material storage. The NPL-8 Landfill remains a fenced, radium-226 contaminated, vegetation-covered open land that also now includes the constructed contaminated soil stockpile that was capped consistent with Title 35 of the IAC, Part 811. The previously vegetated portions of the ROW and Bill Walsh property excavation areas were revegetated with grass. Figure 22 documents the as-built site conditions at the conclusion of RA activities.

Post-RA routine operation and maintenance site visits were also conducted about once per month through April 2021 to monitor vegetation growth, potential erosion, and other site conditions in restored areas and on the contaminated soil stockpile that may require attention.

Consistent with Title 35 of the IAC, Part 811, maintenance and inspection activities of the cap and vegetation should be performed, including the following:

Inspections

- Inspect quarterly for a minimum period of 15 years after cap construction completion. After 5 years, the inspection frequency may be reduced if settling has stopped and there are no eroded or scoured areas;
- Inspect the capped stockpile to identify the cap integrity, evidence of erosion, ponding water, poor vegetation, settlement, and deep-rooted vegetation; and
- Inspect the perimeter fencing to ensure site security is maintained.

Routine Maintenance

- Mow the stockpile at least two times per year.
- Remove any trees or deep-rooted plants.
- Address any animal burrows in the cap.

Corrective Maintenance

- Re-contour and fill all rills, gullies, and crevices six inches or deeper identified in the capping materials.
- Re-contour and fill all holes and depressions created by settling to prevent standing water.
- Repair all eroded and scoured drainage channels.
- Revegetate with grass seed all reworked surfaces, and areas with failed or eroded vegetation.
- Cut and move felled trees along the fence line or in unsecure positions.

8.0 SUMMARY OF PROJECT COST

The NPL-8 Frontage Property RA costs were approximately $3.7 million, as summarized in Table 8. The cost breakdown in Table 8 includes the following major subcontracted elements of the RA: excavation and waste management; health physics and on-site analytical services; and off-site analytical services. Other RA costs included in this breakdown include (1) property access costs for the personnel parking area on the Bill Walsh property to access the RA support zone and (2) SulTRAC's post-remedial design engineering costs from May 2019 through December 2020. SulTRAC's engineering costs include RA management and engineering support; subcontractor procurement and oversight; cleanup verification and other on-site sampling, including equipment and supplies; RA progress reporting; and fee and other markups. Total estimated RA costs for the NPL-8 Frontage Property documented in the Superfund State Contract between EPA and IEMA were about $4.1 million (EPA and IEMA 2018).

9.0 OBSERVATIONS AND RECOMMENDATIONS

During the RA, SulTRAC made observations and provided associated recommendations, which were then implemented, as summarized below.

Observation	Recommendations	Implementation
Project Planning		
Proposed excavation extent and remedial design volumes based on RI results did not match the actual excavation extent and volume. The expansion of the excavation areas resulted in unforeseen site logistics challenges for equipment to access excavation areas and for clean overburden stockpile management.	Conduct supplemental investigations as needed, such as trenching, test pitting, downhole gamma logging, or a combination of all three prior to future RA activities to complement historical site data. Supplemental investigations would resolve uncertainty in future remedial design extents and volumes.	During RA activities, SulTRAC conducted supplemental investigation activities, such as test pitting and downhole gamma logging, to assess remaining radium-226 contamination extents. SulTRAC provided this data to EPA and IEMA to review prior to expanding RA activity scope or to provide additional data for future RA activities at the Frontage Property and Bill Walsh property.
The Frontage Property was an active commercial property owned and operated by GRE. This resulted in logistical challenges for completing excavations and setting exclusion zones as GRE was continually permitted access to at least half of the property for the duration of the RA.	Increase focus on excavation sequencing and stockpile staging versus available area during pre-planning. If possible, request and obtain access to full property areas in the future for ease of securing the EZ, managing excavation areas, and managing clean stockpiles.	During RA activities, SulTRAC coordinated closely with GRE regarding site access and often re-sequenced work to safely accommodate site access required by GRE This involved temporarily pausing work at certain larger excavation areas to complete excavation work in other smaller areas. While full access to the site would have allowed for more efficient sequenced excavation, this coordination, intermittent excavation, and other resequencing of work allowed for excavation work to be ongoing with minimal delays and the overall project schedule to be met.

Observation	Recommendations	Implementation
The ROW excavation areas, as well as the Bill Walsh property excavation area are located in a high-density utility corridor for the City of Ottawa.	During RA pre-planning, consider the potential impacts to RA schedule from excavation within a high-density utility corridor. During RA implementation, increase frequency of utility locates and "watch and protect" services by critical utilities, use hand digging near utilities, and decrease excavator size and bucket for excavation over and between hazardous and critical utilities.	During the ROW excavation in 2019, a large excavator was utilized. This increased excavation duration because additional hand digging was required to supplement the excavation in areas where the excavator bucket was too large to pass between utilities. Therefore, the subsequent ROW and Bill Walsh property excavation was conducted with a smaller excavator. While this reduced the soil volume by bucket, it increased overall excavation efficiency because most excavation work could be conducted by the equipment. Two laborers were utilized for the majority of excavation days in the utility corridor, which assisted in visually identifying utilities and conducting hand digging as necessary. Frequent utility locates were called in as necessary when utility markings were lost and "watch and protect" service requests were submitted for hazardous or critical utilities, which reduced risk while excavating near these utilities.
Project Implementation		
Significant gamma shine was observed from radium-226-contaminated material remaining in place along walls of final excavation extents during final excavation floor gamma walkover surveys prior to verification sampling. The contaminated material remaining in place was in areas that were outside the area or below the depth of excavation included in the RA scope of work.	Where possible, when excavating specified areas and leaving radium-226 contamination along excavation walls, plan to over excavate clean material by increasing the lift size at the surface of the excavation floor and plan for field determination of potential elimination or inclusion of partial grid verification.	The floors of excavation areas, particularly in Area D, were over-excavated several times following gamma walkover surveys and verification samples not meeting the RAO following analysis by on-site field gamma spectroscopy. The gamma shine and associated number of over excavations and resamples could have been reduced by increasing the over-excavation lift sizes, saving time and cost; however, this could unnecessarily increase excavation volumes which may increase disposal costs. To provide verification of clean excavation floors, SulTRAC and SAHCI attempted to verify partial grids abutting remaining contamination on the walls in Area D. Elimination of these partial grids from verification sooner could have reduced the number of rounds of sampling and re-analysis; however, in instances where future excavation is possible, partial grid verification could prevent unnecessary future excavation into clean overburden and backfill.

Observation	Recommendations	Implementation
Potential erosion issues of contaminated material remaining in place needed to be addressed. Material was separated into clean verified full and partial grids. Contaminated material remaining in place was in areas that were outside the area or below the depth of excavation included in the RA scope of work.	Institute erosion controls.	To prevent erosion of radium-226 material in Area D into excavation grids, orange demarcation fabric was placed over the excavation sidewalls with silt fencing and straw wattles placed at the excavation bottom until backfill operations began.
Logistical challenges occurred for clean overburden stockpile management from (1) the work area reduction because GRE was permitted access to at least half the property during the RA and (2) expansion of excavation areas beyond the design extents.	During pre-planning, increase focus on stockpile management implementation and procedures; consider backfill sequencing immediately after excavations are verified clean where space allows.	RA sequencing primarily focused on completing all excavation activities and then backfilling. This allowed for reduction of personnel and equipment on site but increased the overall schedule duration. Stockpiles were moved as needed to allow for equipment access and to overcome this challenge. Backfilling, as individual excavations were completed instead of moving stockpiles, may have increased cost with additional equipment and personnel, but also may have reduced schedule duration.
Extended duration of staging of clean and contaminated stockpiles resulted in soil saturation and required saturated soil management with dewatering agents (calciment and bulk lime).	During pre-planning, consider backfill sequencing soon after excavations are verified clean where space allows.	RA sequencing primarily focused on completing all excavation activities and then backfilling and dewatering agents were effectively used to prepare soil for backfilling and compaction. Backfilling sooner after verification of excavation area grids may have increased cost with additional equipment and personnel, but also would have reduced dewatering agent cost and may have reduced schedule duration.
RA Activities were conducted during the COVID-19 pandemic from April 27, 2020, until August 14, 2020. SulTRAC was able to safely conduct and complete RA activities without schedule delays by implementing site-specific COVID-19 safety measures.	Reduce staff interaction in enclosed spaces, increase social distancing in enclosed and outdoor spaces to at least 6 feet, implement requirement of masks when 6-foot social distancing is not possible, increase access to sanitary facilities and hand sanitizer when sanitary facilities are not practical, increase cleaning frequency, increase personal health awareness for symptom checks prior to arrival on site.	Throughout the duration of the RA, SulTRAC was able to avoid COVID-related delays by reducing the number of personnel within site trailers, maintaining separate site trailers for SulTRAC and TriEco personnel, posting signage on trailer doors indicating visitors to remain outside, providing an additional hand washing station, increasing frequency of sanitary facility cleaning, requiring face masks, observing social distancing of 6 feet when possible, employing additional cleaning measures, and ensuring communication protocols were in place for personnel potentially experiencing symptoms. SulTRAC had back-up staff available and added COVID-19 safety as a regular daily safety meeting topic.

10.0 CONTACT INFORMATION

SulTRAC			
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City Departments			
Engineering	David Noble	(815) 433-0161	engineer@cityofottawa.org
Police	Police	(815) 433-2131	

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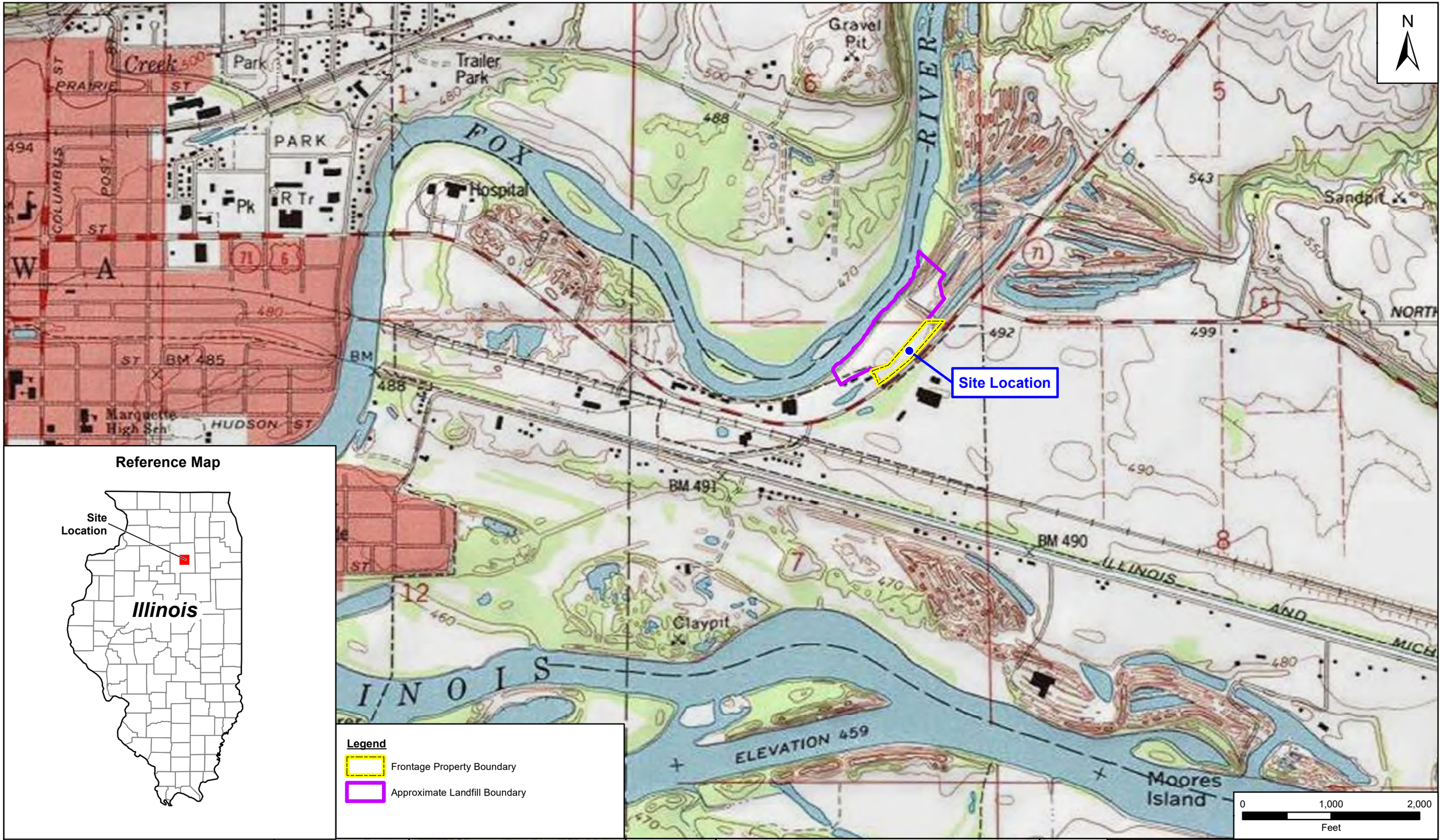
APPENDIX A

FIGURES



Reference Map

Legend

- Frontage Property Boundary
- Approximate Landfill Boundary

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

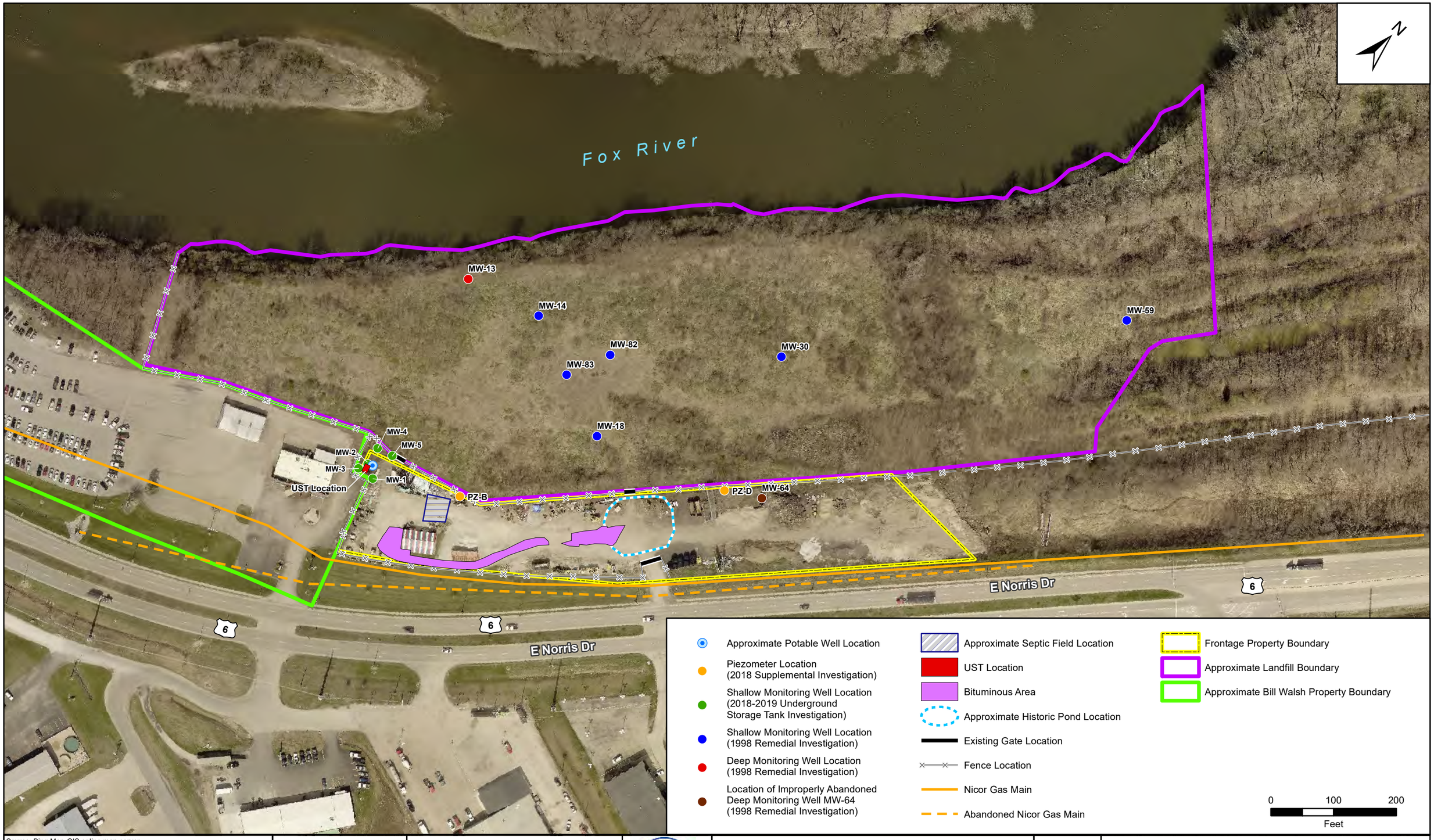
SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 1
SITE LOCATION

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig1-SiteLocation.mxd m.banh



Source: Bing Map-GIS online map server

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NPL-8 FRONTAGE PROPERTY SITE
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 2
SITE LAYOUT AND PRE-EXISTING CONDITIONS

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig2-SiteLayout.mxd m.banh

Legend

Parcel

Existing Gate Location

Fence Location

0 100 200

Feet

Source: Bing Map-GIS online map server

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DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

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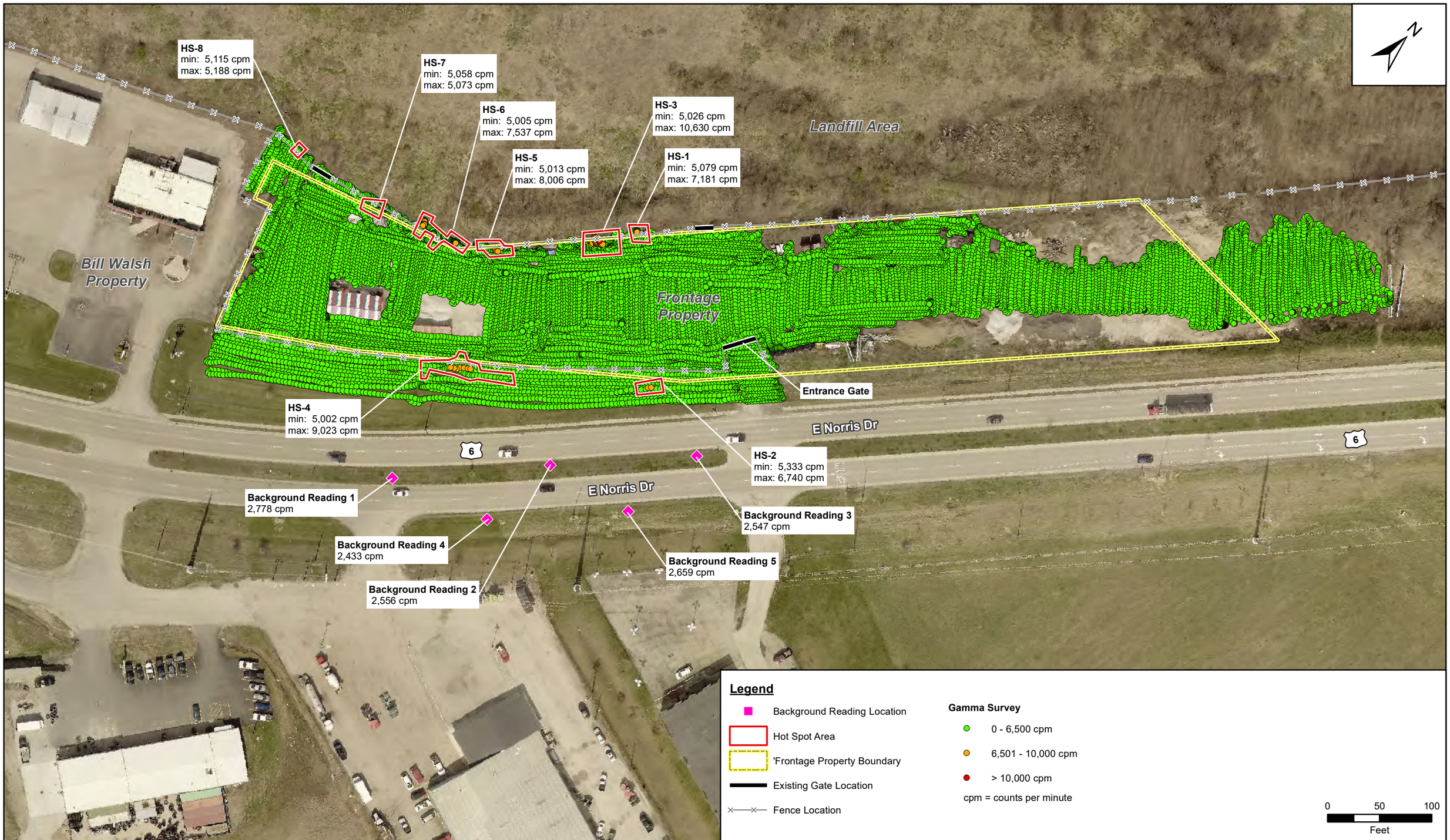
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 3
PARCEL BOUNDARIES

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig3-ParcelBoundaries.mxd m.banh



Legend

- Background Reading Location
- Hot Spot Area
- 'Frontage Property Boundary
- Existing Gate Location
- Fence Location

Gamma Survey

- 0 - 6,500 cpm
- 6,501 - 10,000 cpm
- > 10,000 cpm

cpm = counts per minute

0 50 100
Feet

Source: Bing Map-GIS online map server

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PROJECT NO.	103G1852334
DATE:	APRIL 2021

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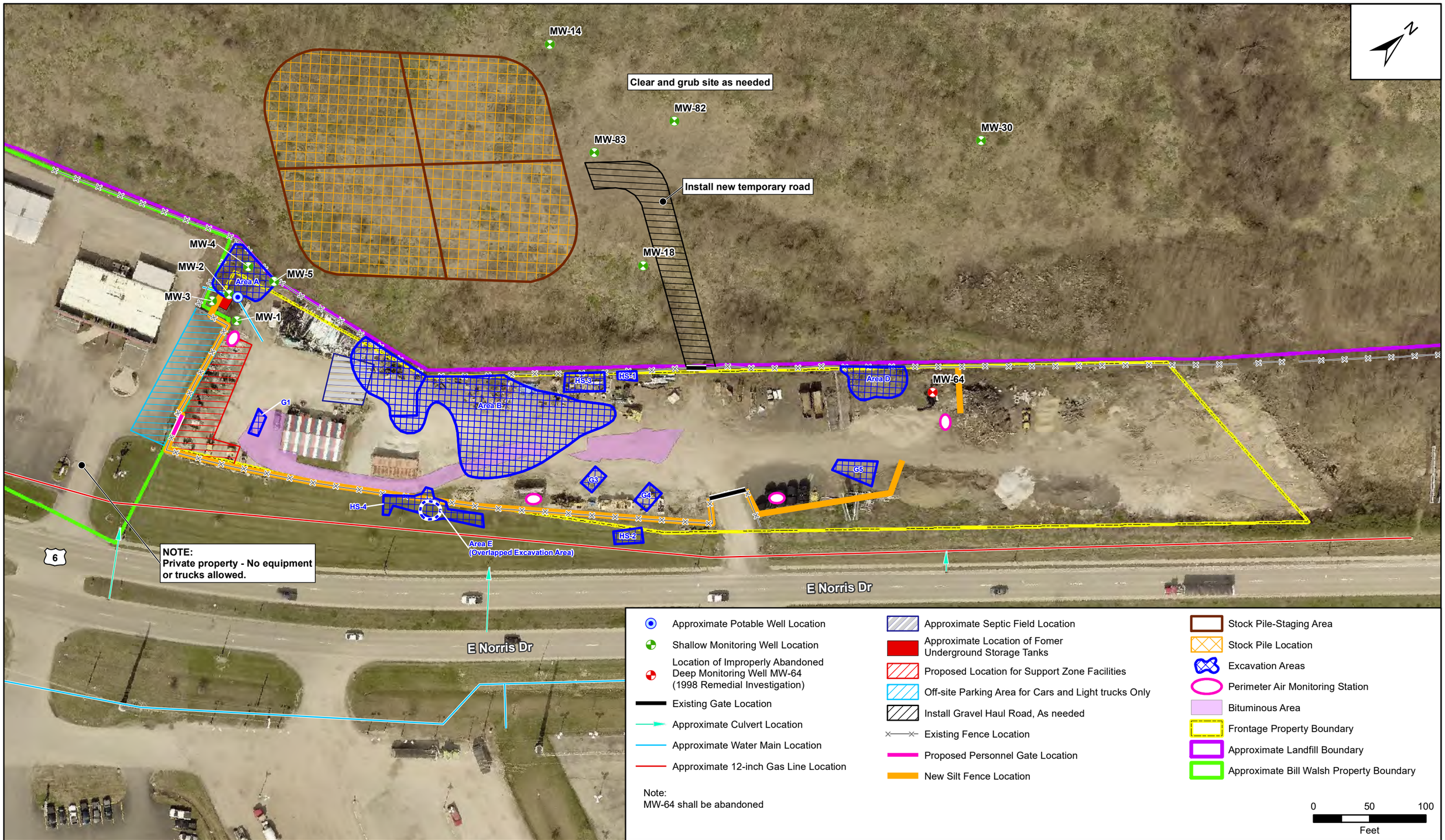
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 4
PRE-CONSTRUCTION SURFACE GAMMA SURVEY (2018)

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig4-Pre-ConstructionGammaSurvey.mxd m.banh



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NPL-8 FRONTAGE PROPERTY SITE
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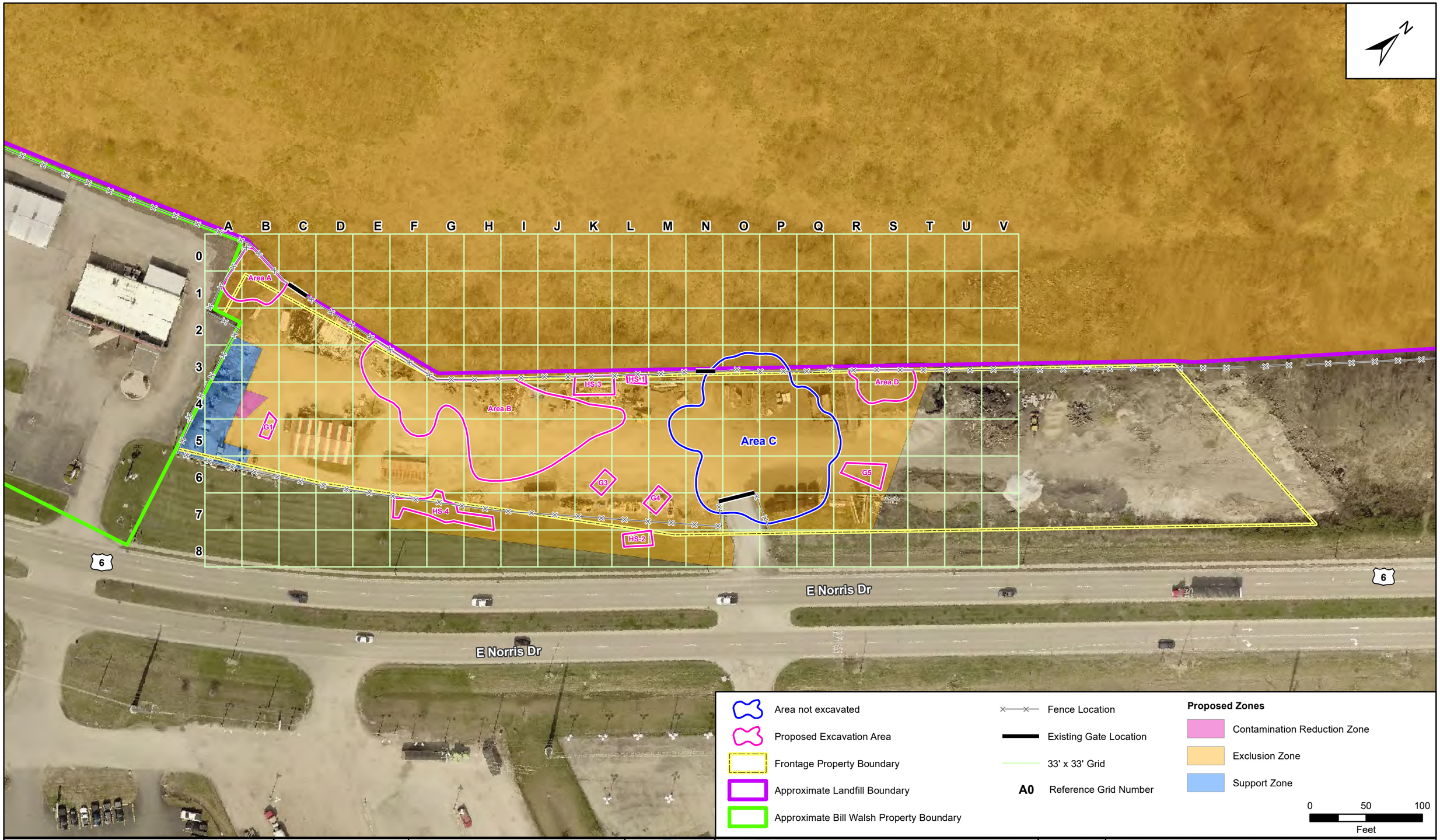
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 5
REMEDIAL DESIGN OBJECTIVES

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig5-RemedialDesignObjectives.mxd m.banh



Source: Bing Map-GIS online map server

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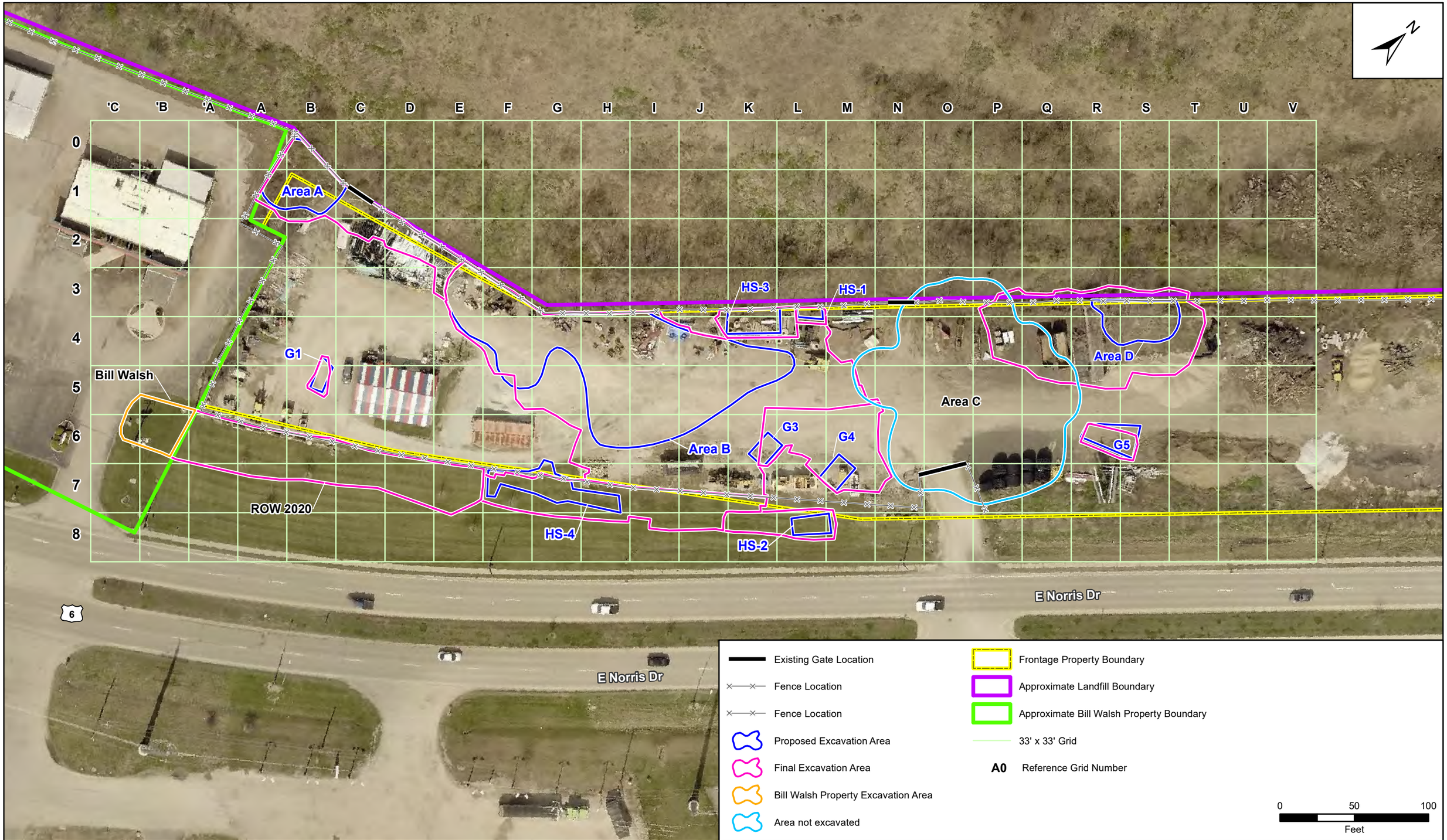
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 6
REFERENCE GRIDS, PROPOSED ZONES, AND EXCAVATION AREAS

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig6-PropExcavationAreas.mxd m.banh



Source: Bing Map-GIS online map server

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PROJECT NO.	103G1852334
DATE:	APRIL 2021

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 7
FINAL REFERENCE GRIDS AND FINAL EXCAVATION LIMITS

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig7-ExcavationLimits.mxd m.banh

E Norris Dr

- Existing Gate Location
- Fence Location
- Excavation Boundary
- Excavation Contour (interval = 5 feet)
- Excavation Contour (interval = 1 foot)
- Frontage Property Boundary
- Approximate Landfill Boundary
- Approximate Bill Walsh Property Boundary

Post Excavation Topographic Survey drawings are provided by Renwick & Associates, Inc.
20200624 saved ACAD ver 2013 (#18.206.1) for TriEco, LLC - NPL-8 Site Expansion - Post-Excavation Topographic Survey.dwg
20191220 saved ACAD ver 2013 (#18.206.1) for TriEco, LLC - NPL-8 Site - Post-Excavation Topographic Survey.dwg

0 25 50
Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
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PROJECT NO.	103G1852334
DATE:	APRIL 2021

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NPL-8 FRONTAGE PROPERTY SITE
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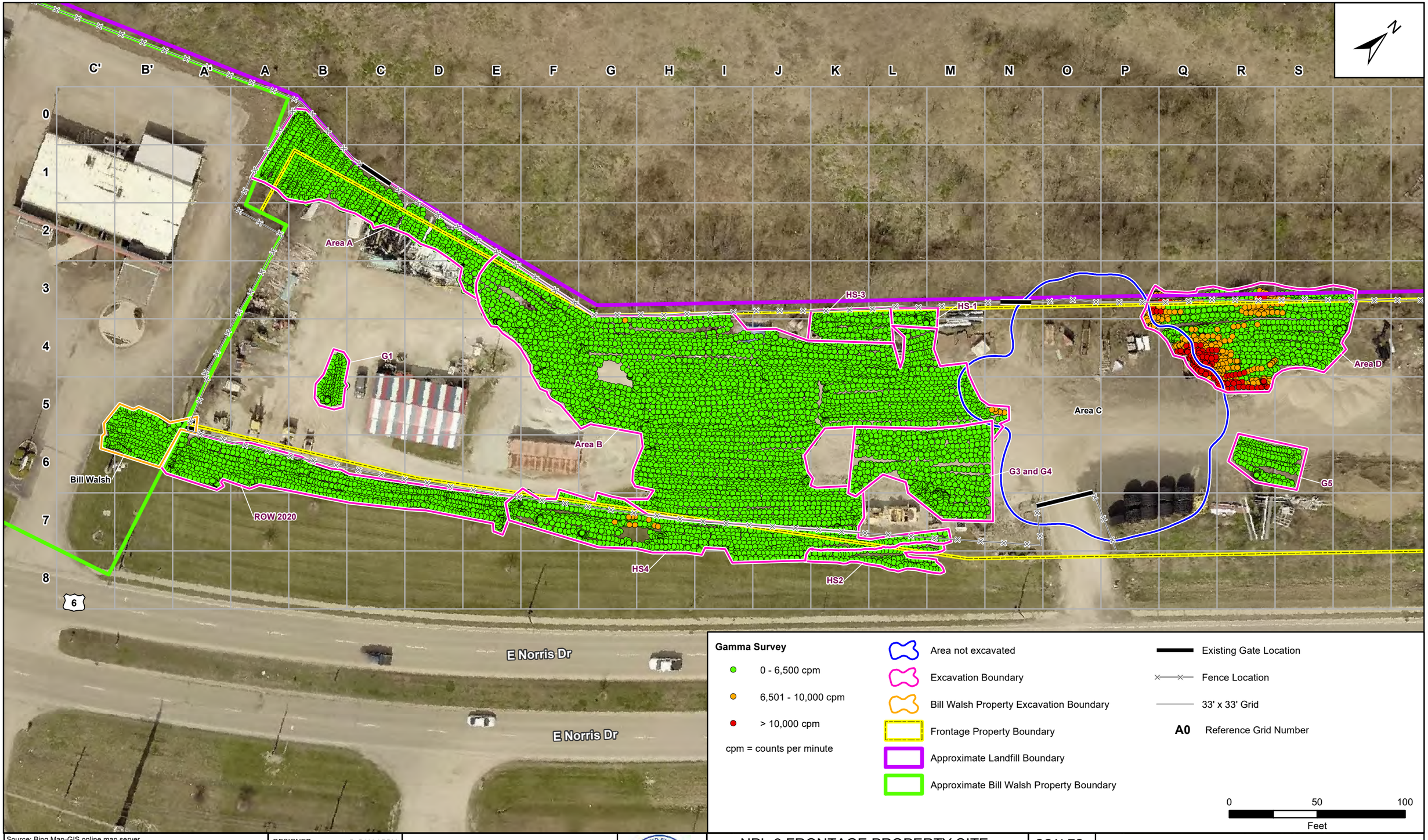
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 8
HORIZONTAL AND VERTICAL EXTENTS OF EXCAVATION

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig8-HorizontalVerticalExcavationExtents.mxd m.banh



Gamma Survey

- 0 - 6,500 cpm
- 6,501 - 10,000 cpm
- > 10,000 cpm

cpm = counts per minute

- Area not excavated
- Excavation Boundary
- Bill Walsh Property Excavation Boundary
- Frontage Property Boundary
- Approximate Landfill Boundary
- Approximate Bill Walsh Property Boundary
- Existing Gate Location
- Fence Location
- 33' x 33' Grid
- **A0** Reference Grid Number

0 50 100
Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

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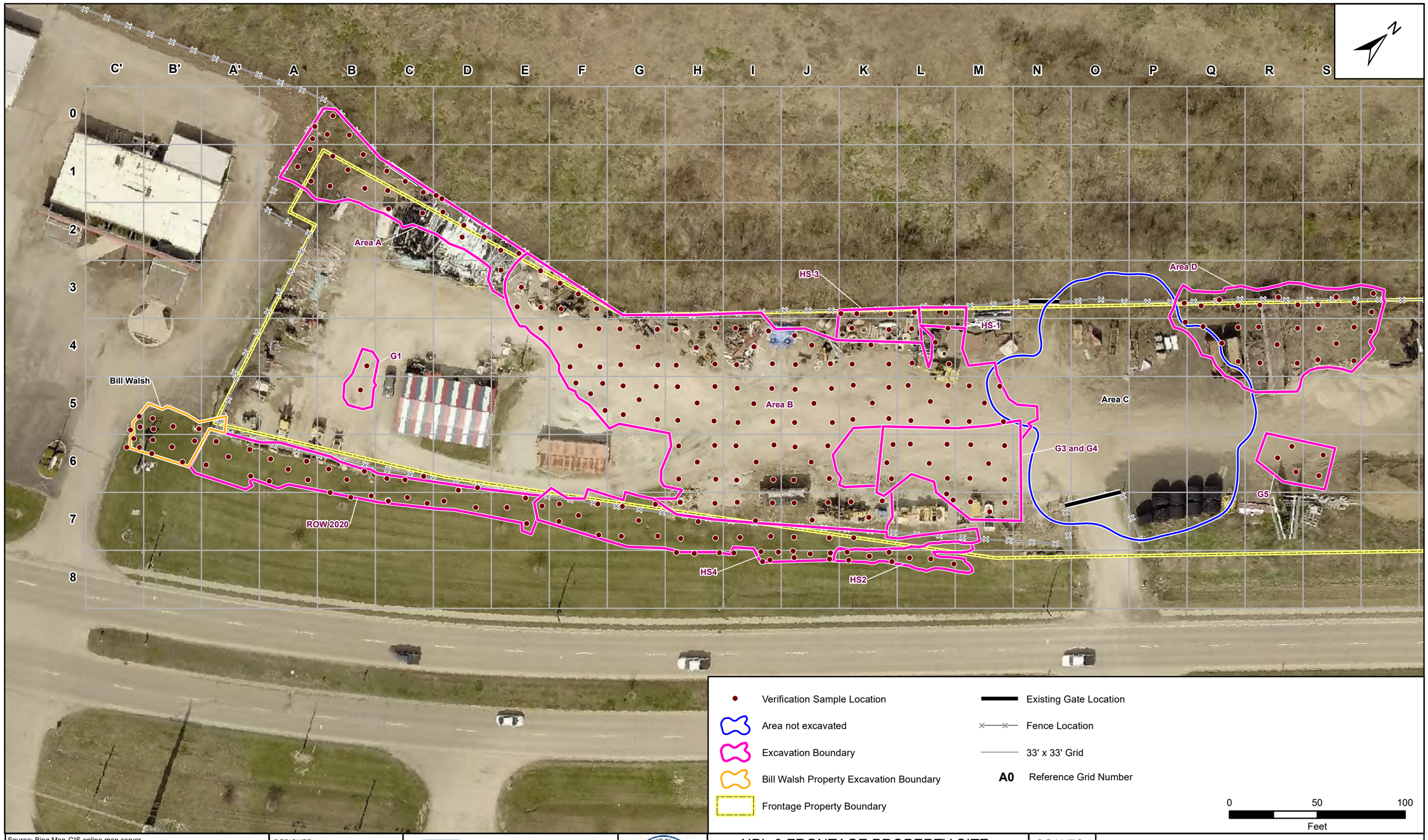
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 9
POST-EXCAVATION GAMMA WALKOVER SURVEY

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig9-PostExcavationGammaWalkover.mxd m.banh



Source: Bing Map-GIS online map server

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DATE:	APRIL 2021

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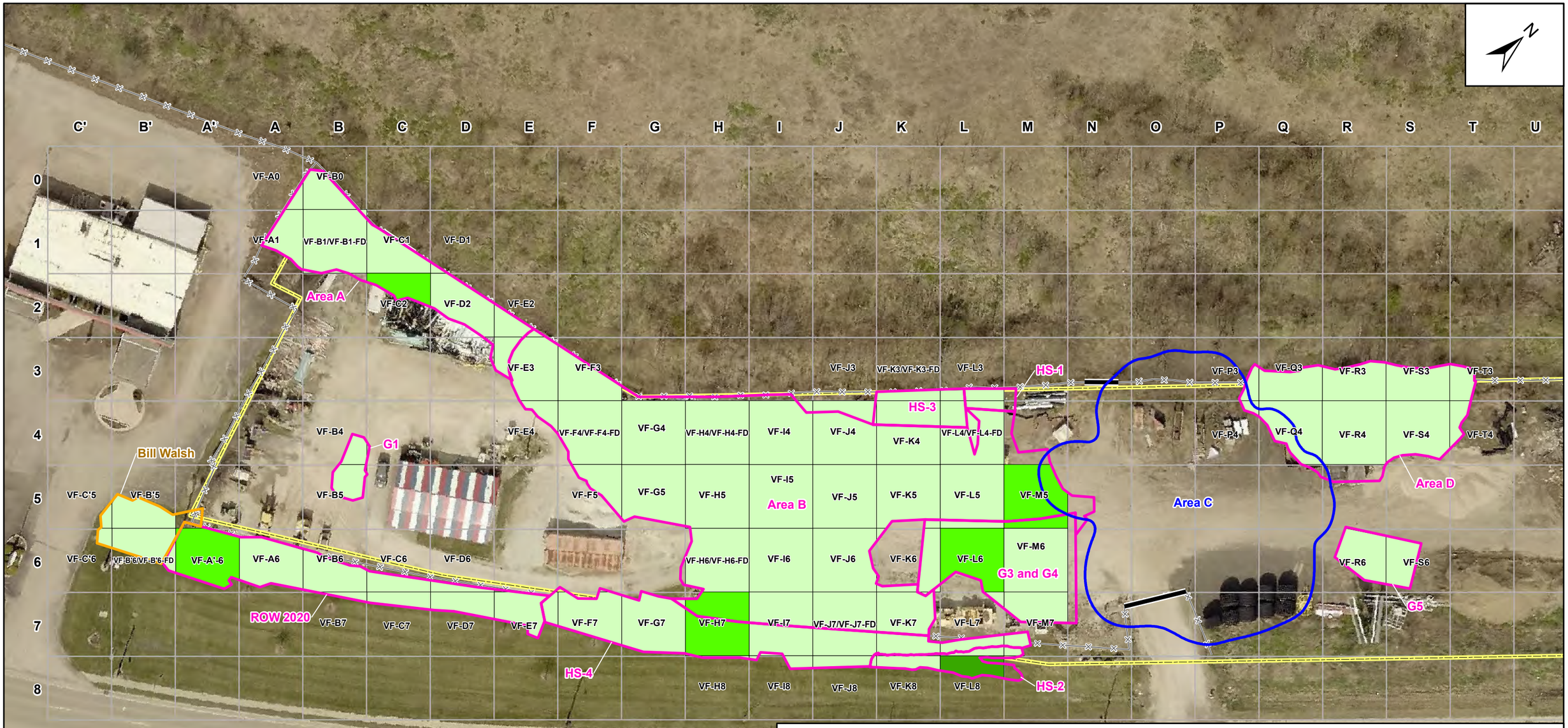
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 10
POST-EXCAVATION
VERIFICATION SAMPLING LOCATIONS

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig10-PostExcavationVerificationSamples.mxd m.banh



Radium-226 (pCi/g)

- 0.00 - 1.99
- 2.00 - 2.99
- 3.00 - 3.03

pCi/g - Picocuries Per Gram

- Area not excavated
- Excavation Boundary
- Bill Walsh Property Excavation Boundary
- Frontage Property Boundary
- Existing Gate Location
- Fence Location
- 33' x 33' Grid
- **A0** Reference Grid Number

0 50 100

Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M. BANH
PROJECT NO.	103G1852334
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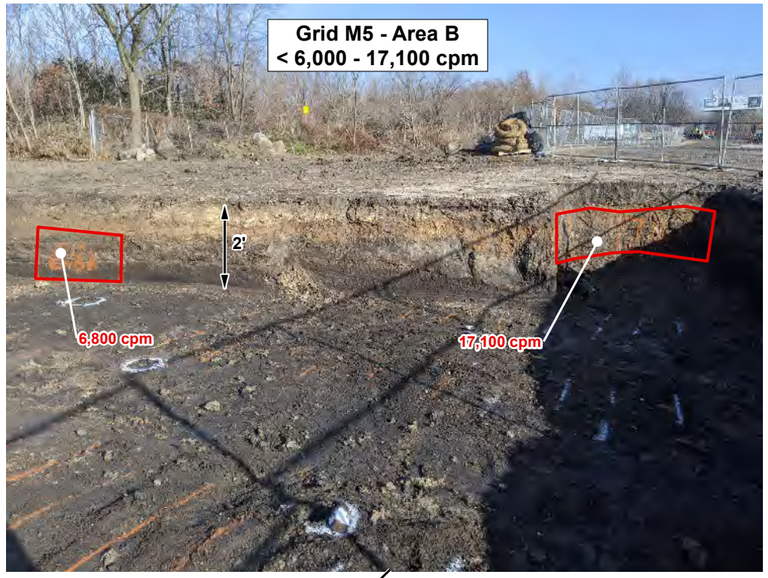
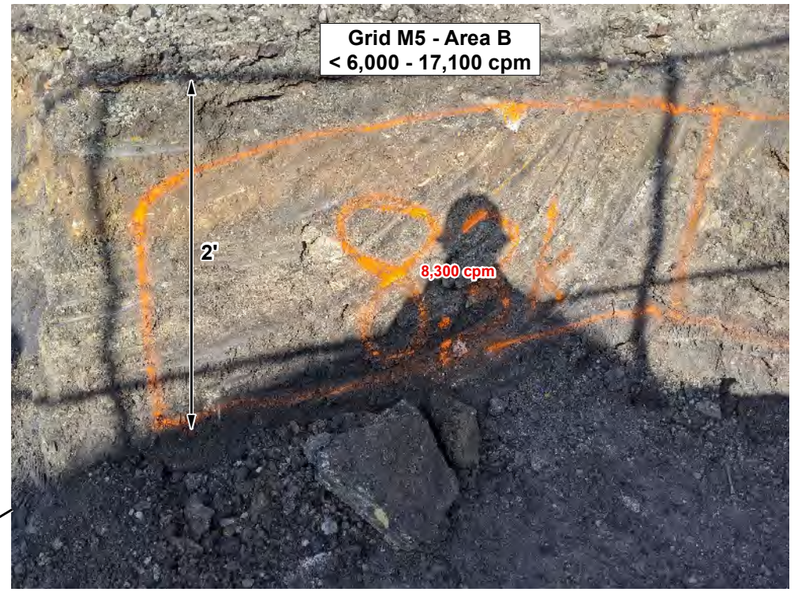
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

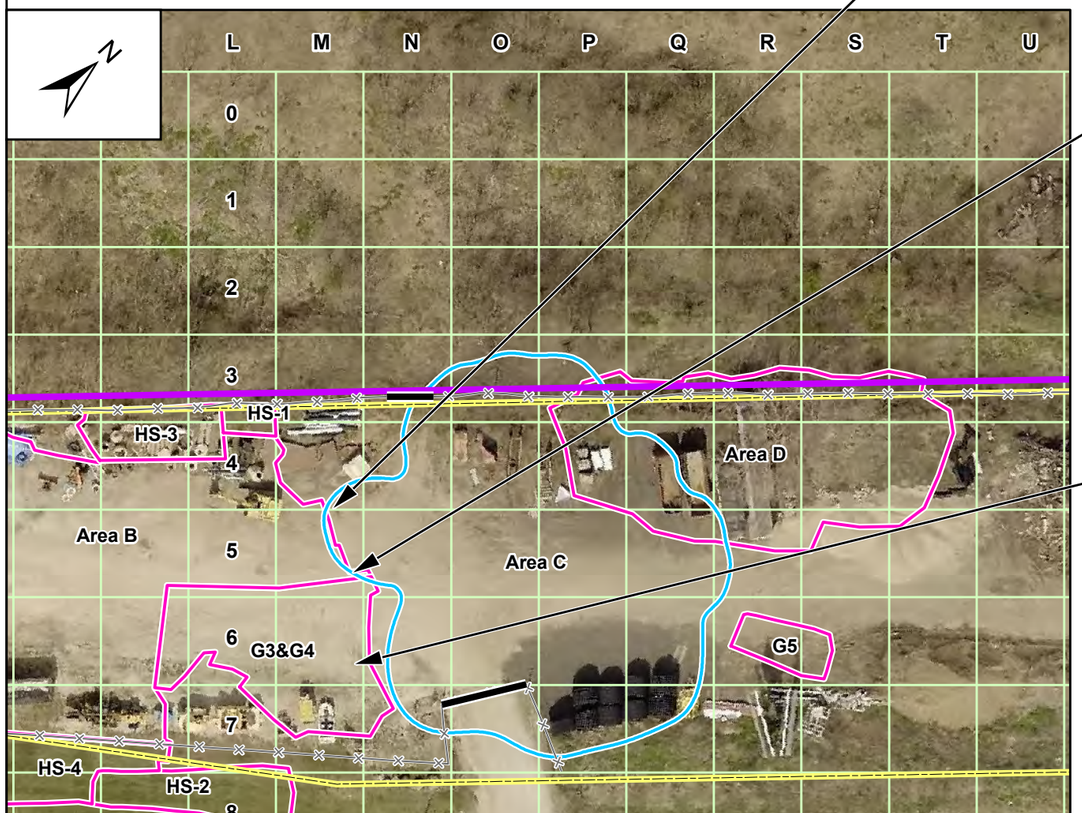
SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 11
POST-EXCAVATION
VERIFICATION SAMPLE RESULTS

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig11-PostExcavationVerificationResults.mxd m.banh







Area not excavated

Final Excavation Area

cpm = counts per minute

Frontage Property Boundary

Approximate Landfill Boundary

Fence Location

Existing Gate Location

33' x 33' Grid

A0 Reference Grid Number

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

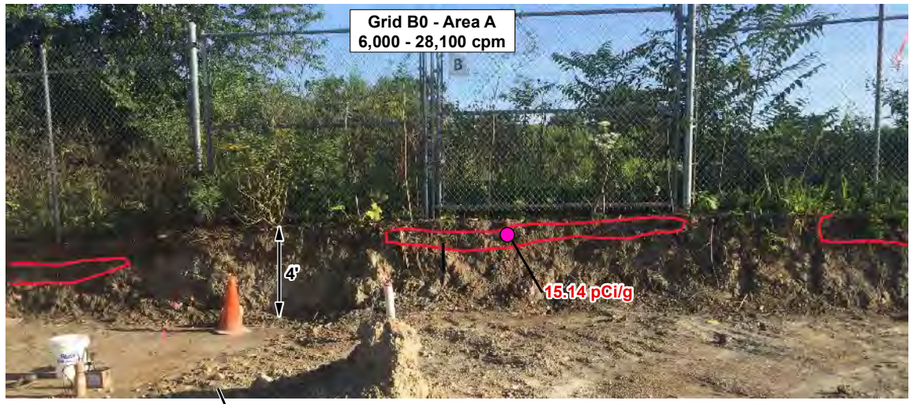
SulTRAC

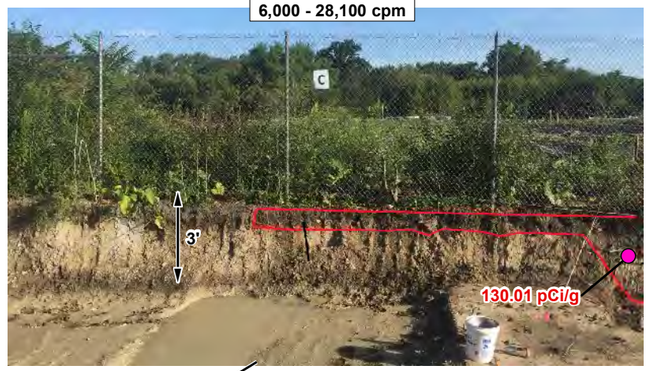
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

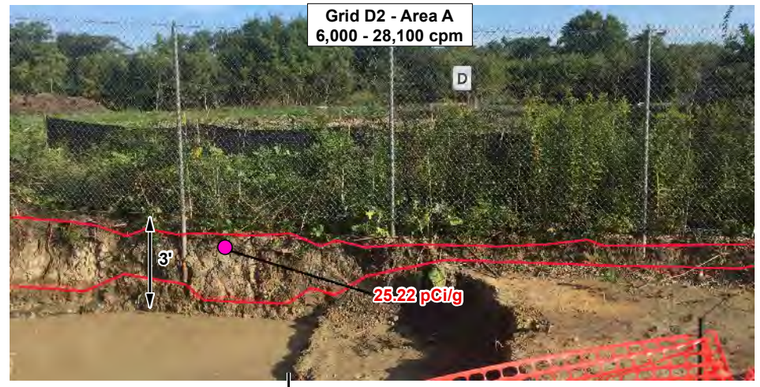
SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

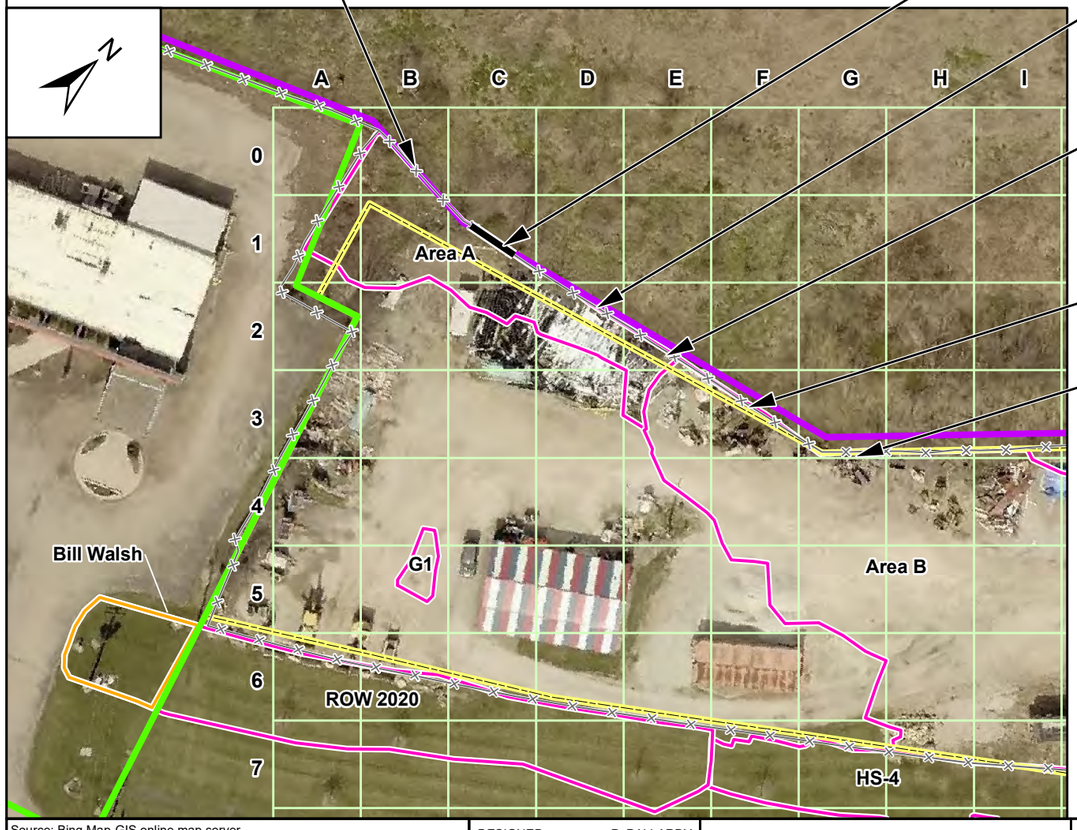
FIGURE 12A
POST-EXCAVATION SIDEWALL SURVEYS OF AREAS B, G3 & G4 - ADJACENT TO AREA C

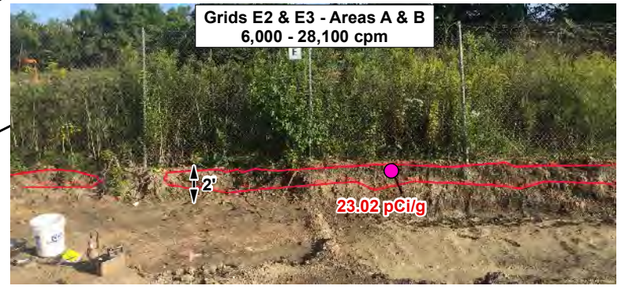
4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig12A-SidewallSurvey-AreasG3_G4_B.mxd m.banh

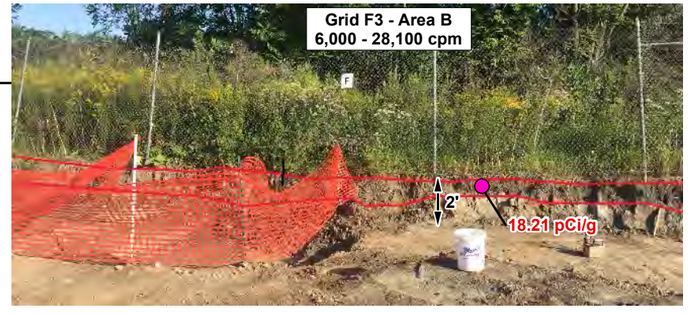












Discrete sample collected from grid sidewall hotspot

Bill Walsh Property Excavation Area

Final Excavation Area

cpm = counts per minute
pCi/g - Picocuries Per Gram

Frontage Property Boundary

Approximate Landfill Boundary

Approximate Bill Walsh Property Boundary

Fence Location

Existing Gate Location

33' x 33' Grid

A0 Reference Grid Number

Source: Bing Map-GIS online map server

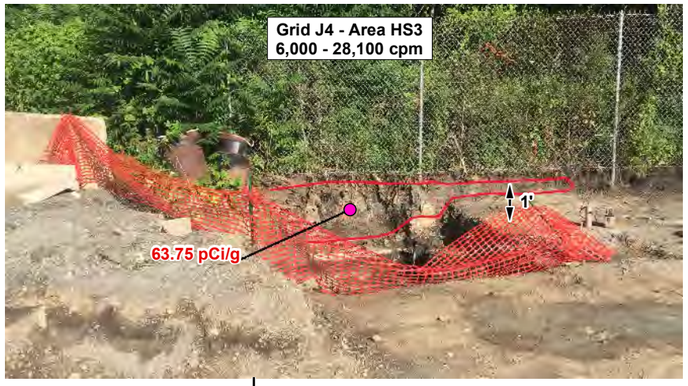
DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

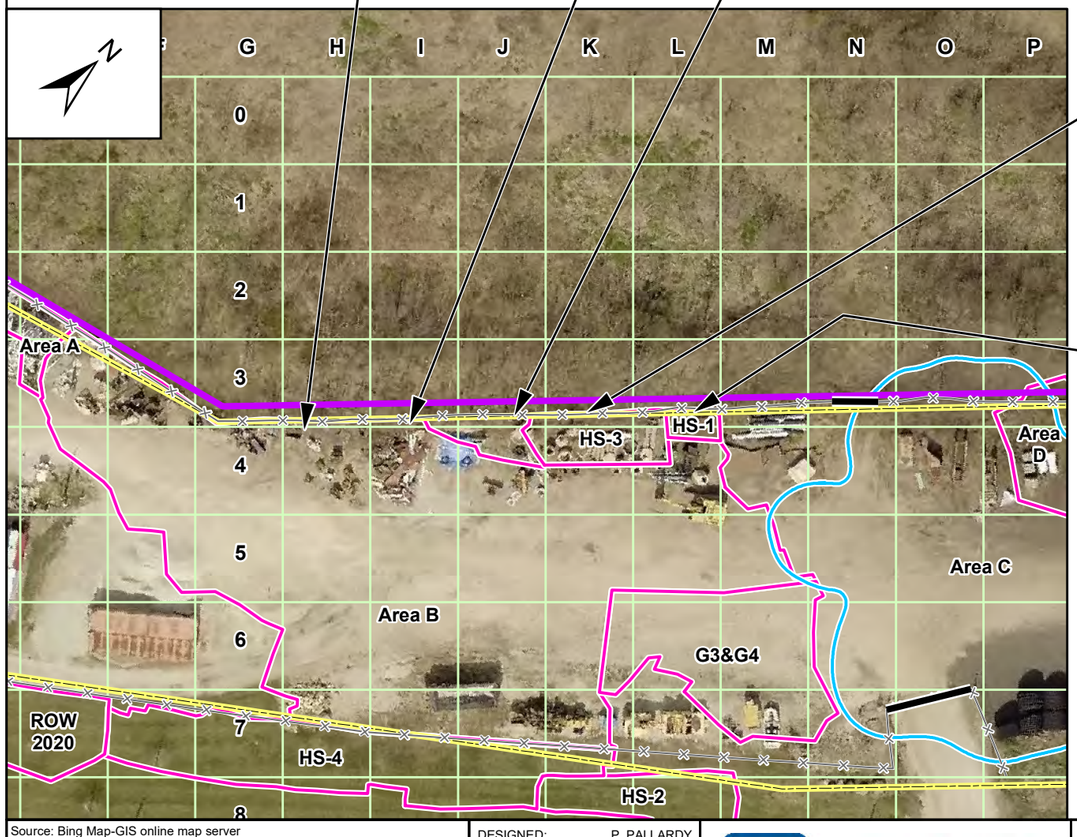
SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 12B
POST-EXCAVATION SIDEWALL SURVEYS OF AREAS A & B - ADJACENT TO THE LANDFILL





cpm = counts per minute
pCi/g - Picocuries Per Gram

- Area not excavated
- Final Excavation Area
- Discrete sample collected from grid sidewall hotspot
- Frontage Property Boundary
- Approximate Landfill Boundary
- Fence Location
- Existing Gate Location
- 33' x 33' Grid
- A0 Reference Grid Number

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

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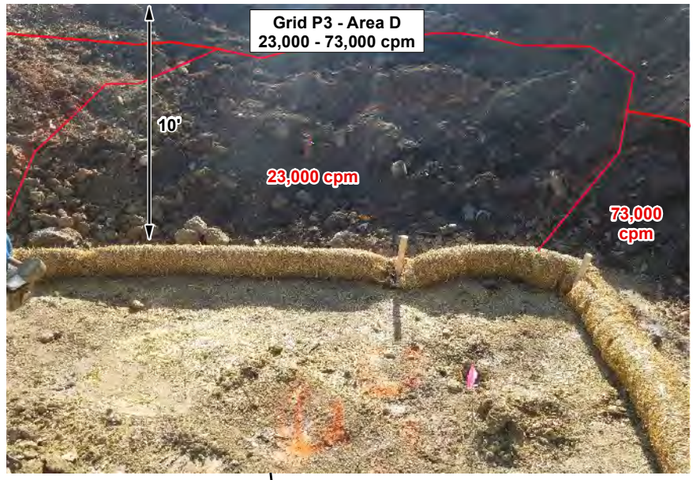
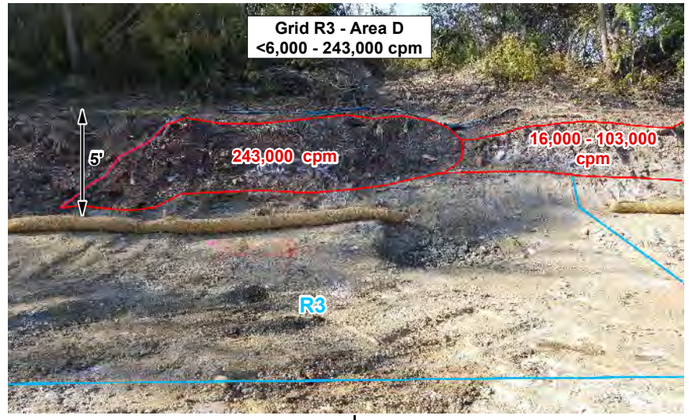
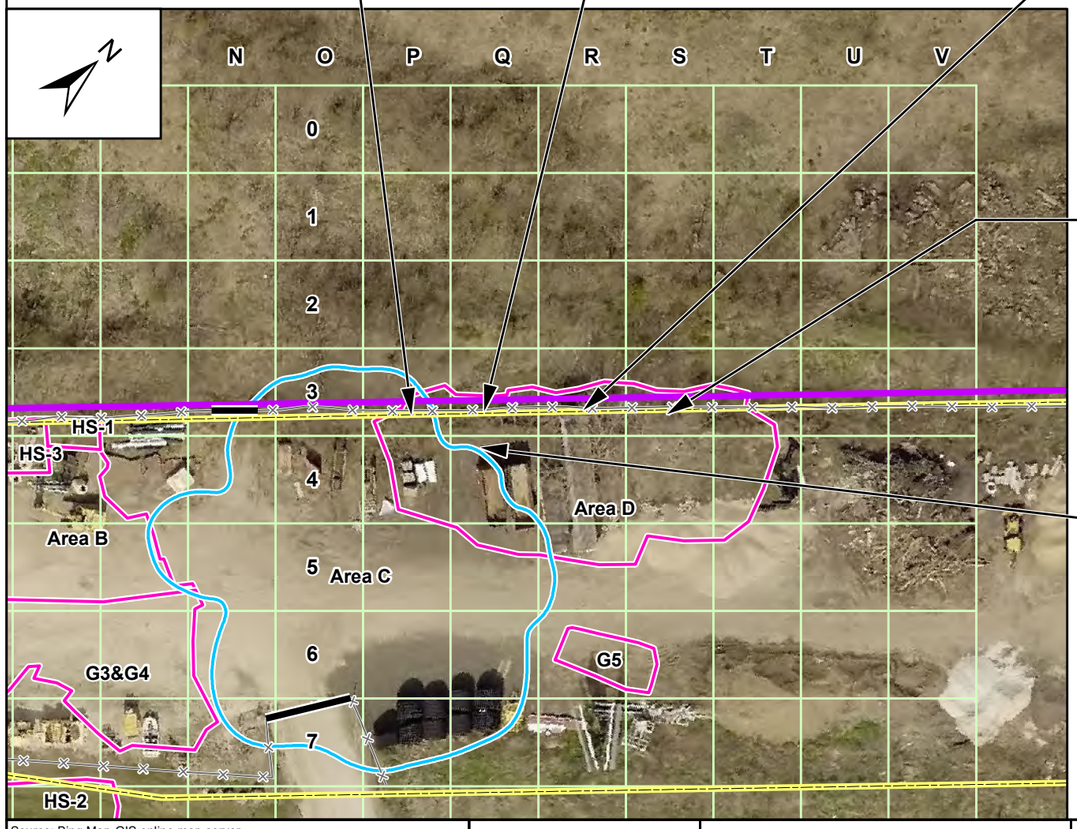
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

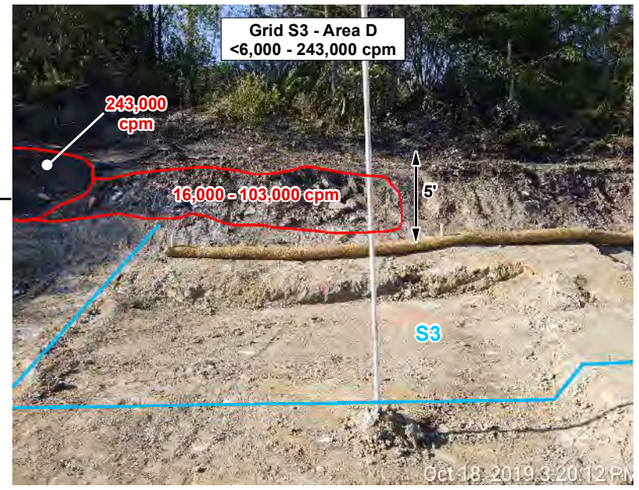
SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

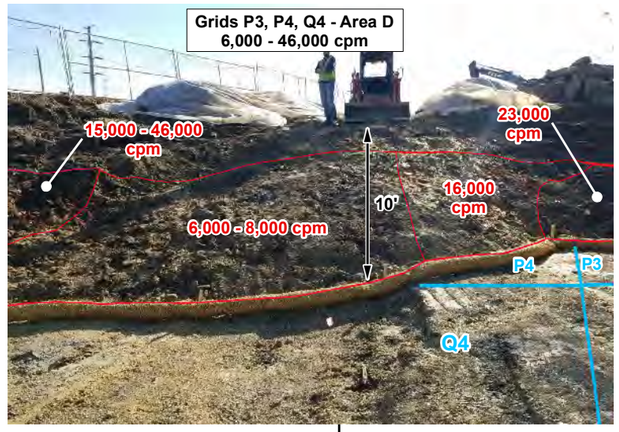
FIGURE 12C
POST-EXCAVATION SIDEWALL SURVEYS OF AREAS B, HS1 & HS3 - ADJACENT TO LANDFILL











Area not excavated

Final Excavation Area

Frontage Property Boundary

Approximate Landfill Boundary

Fence Location

Existing Gate Location

33' x 33' Grid

A0 Reference Grid Number

cpm = counts per minute

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

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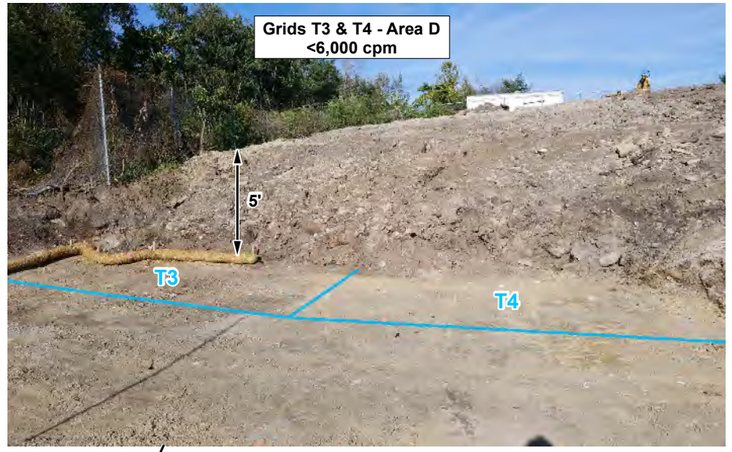
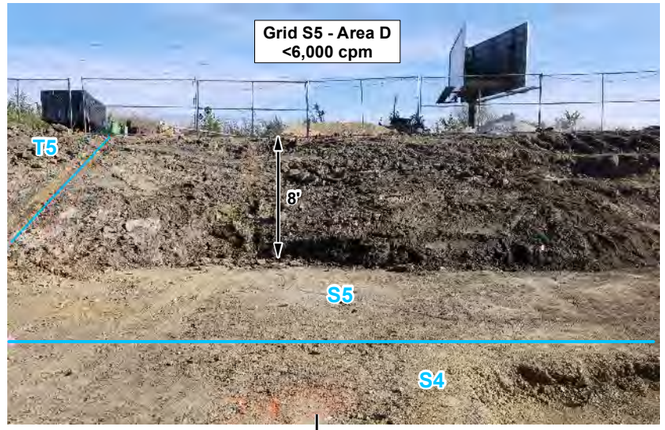
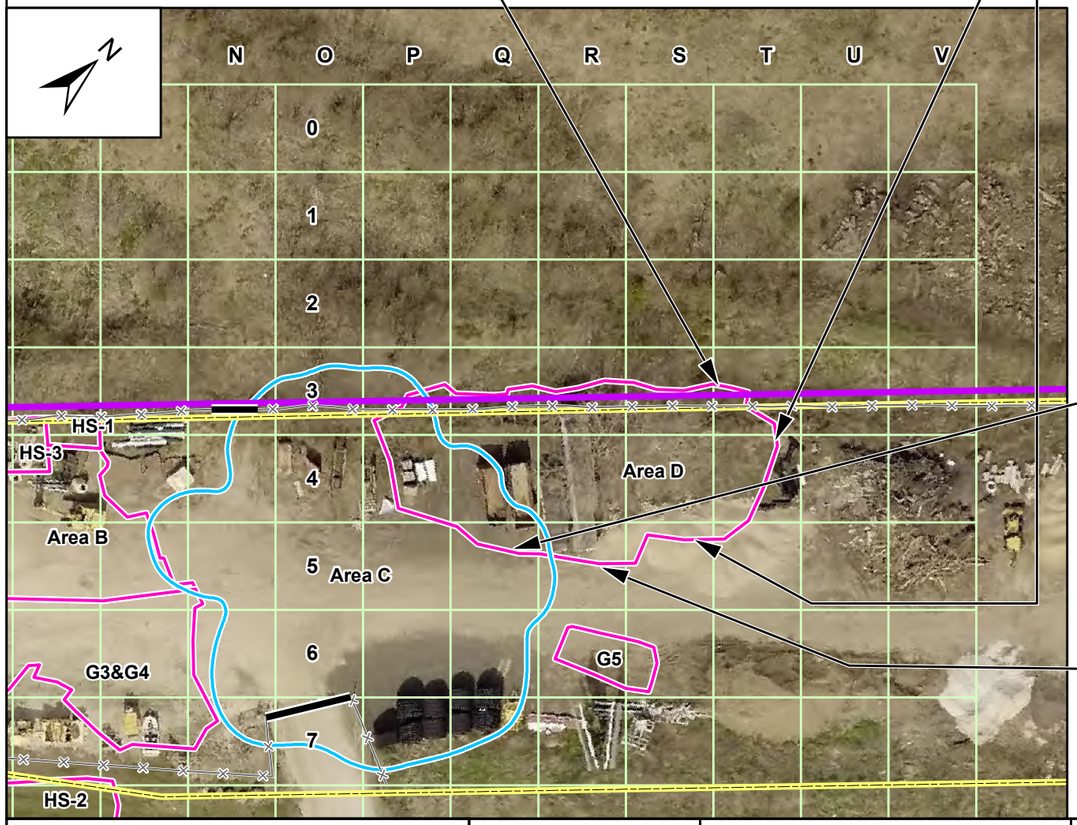
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

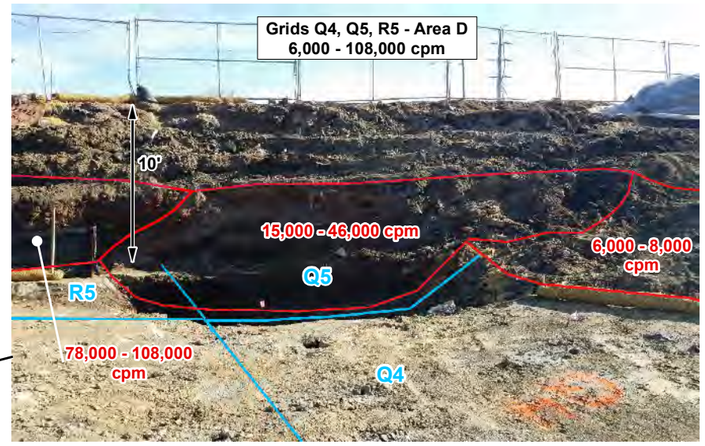
SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

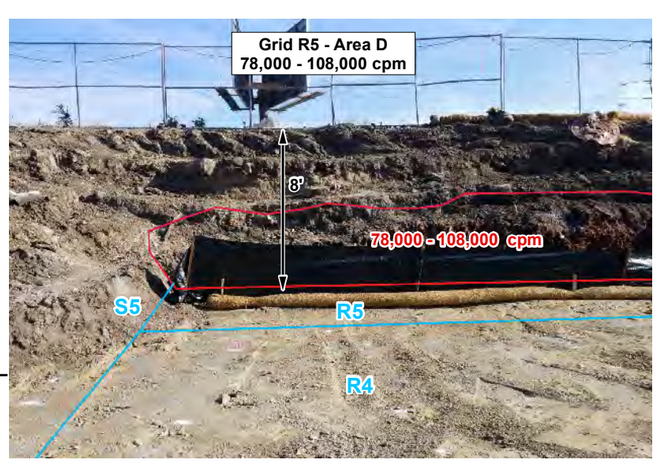
FIGURE 12D
POST-EXCAVATION SIDEWALL SURVEYS OF AREA D - ADJACENT TO AREA C & THE LANDFILL











Area not excavated

Final Excavation Area

cpm = counts per minute

Frontage Property Boundary

Approximate Landfill Boundary

Fence Location

Existing Gate Location

33' x 33' Grid

A0 Reference Grid Number

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	FEBRUARY 2021

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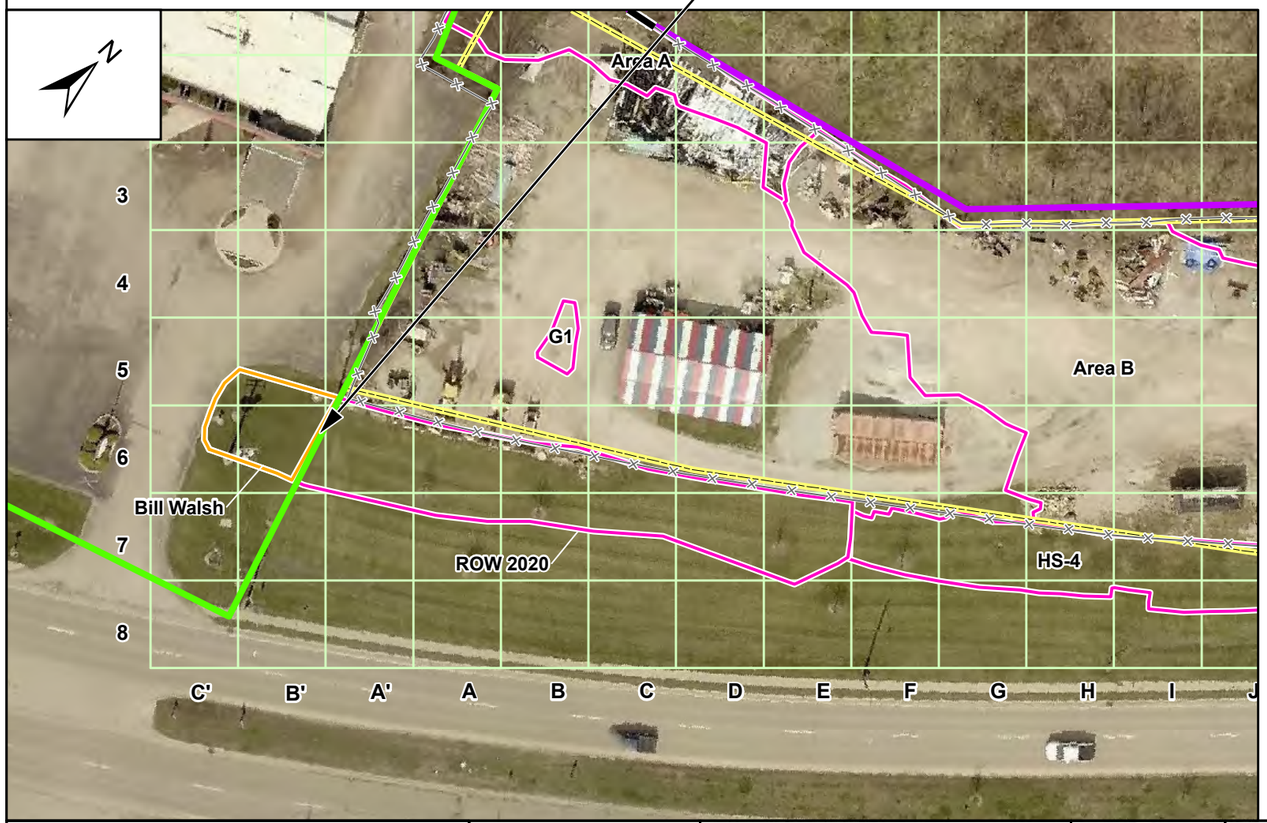
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 12E
POST-EXCAVATION SIDEWALL SURVEYS OF AREA D - ADJACENT TO AREA C, EXTENDED AREA C, AND THE LANDFILL

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig12E-SidewallSurvey-AreasD.mxd m.banh

View of the southwestern-most ROW excavation wall.
The wall was split in half vertically (top "T" and bottom "B") and then split into 9 columns each 2 feet wide.
Each box of the grid was then screened by SAHCI and the highest gamma activity was recorded.
All readings are presented in counts per minute (cpm).



5-point composite sample locations,
On-site gamma spectroscopy result 5.74 pCi/g

Discrete sample location taken from the19,000 cpm hotspot,
Onsite gamma spectroscopy result 95.03 pCi/g

Bill Walsh Property Excavation Area

Final Excavation Area

cpm = counts per minute
pCi/g - Picocuries Per Gram

Frontage Property Boundary

Approximate Landfill Boundary

Approximate Bill Walsh Property Boundary

Fence Location

Existing Gate Location

33' x 33' Grid

A0 Reference Grid Number

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

SulTRAC

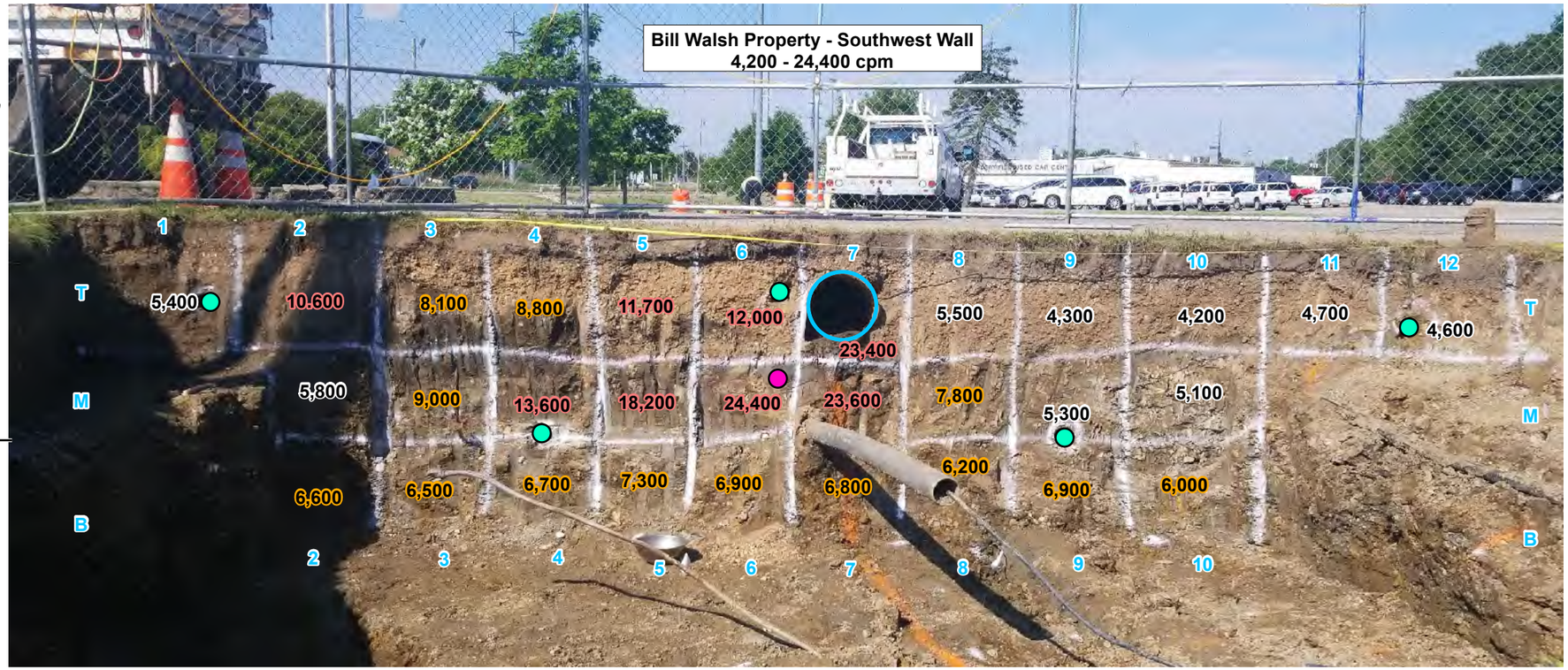
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

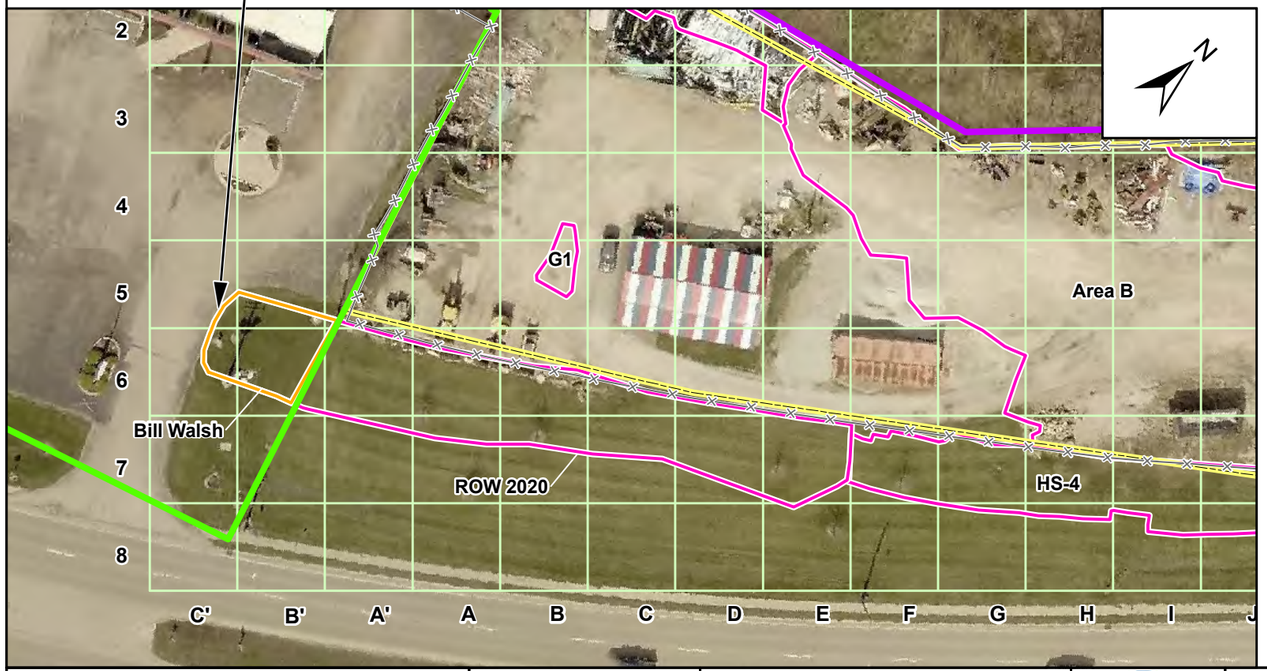
SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 12F
POST-EXCAVATION SIDEWALL SURVEY OF ROW SOUTHWEST WALL

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig12F-SidewallSurvey-ROW.mxd m.banh

View of the southwestern-most excavation wall adjacent to the Bill Walsh asphalt driveway entrance.
The wall was split vertically into 3 rows with each row 2 feet (top "T," middle "M," and bottom "B"), and then split into 12 columns each 2 feet wide.
Each box of the grid was then screened by SAHCI and the highest gamma activity was recorded.
All readings are presented in counts per minute (cpm).





Suspected historical storm-water drainage culvert, Gamma activity within the culvert was 12,000 cpm

5-point composite sample locations, Onsite gamma spectroscopy result 7.60 pCi/g

Discrete sample location taken from the 24,400 cpm hotspot, Onsite gamma spectroscopy result 116 pCi/g

Bill Walsh Property Excavation Area

Final Excavation Area

cpm = counts per minute
pCi/g - Picocuries Per Gram

Frontage Property Boundary

Approximate Landfill Boundary

Approximate Bill Walsh Property Boundary

Fence Location

Existing Gate Location

33' x 33' Grid

A0 Reference Grid Number

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

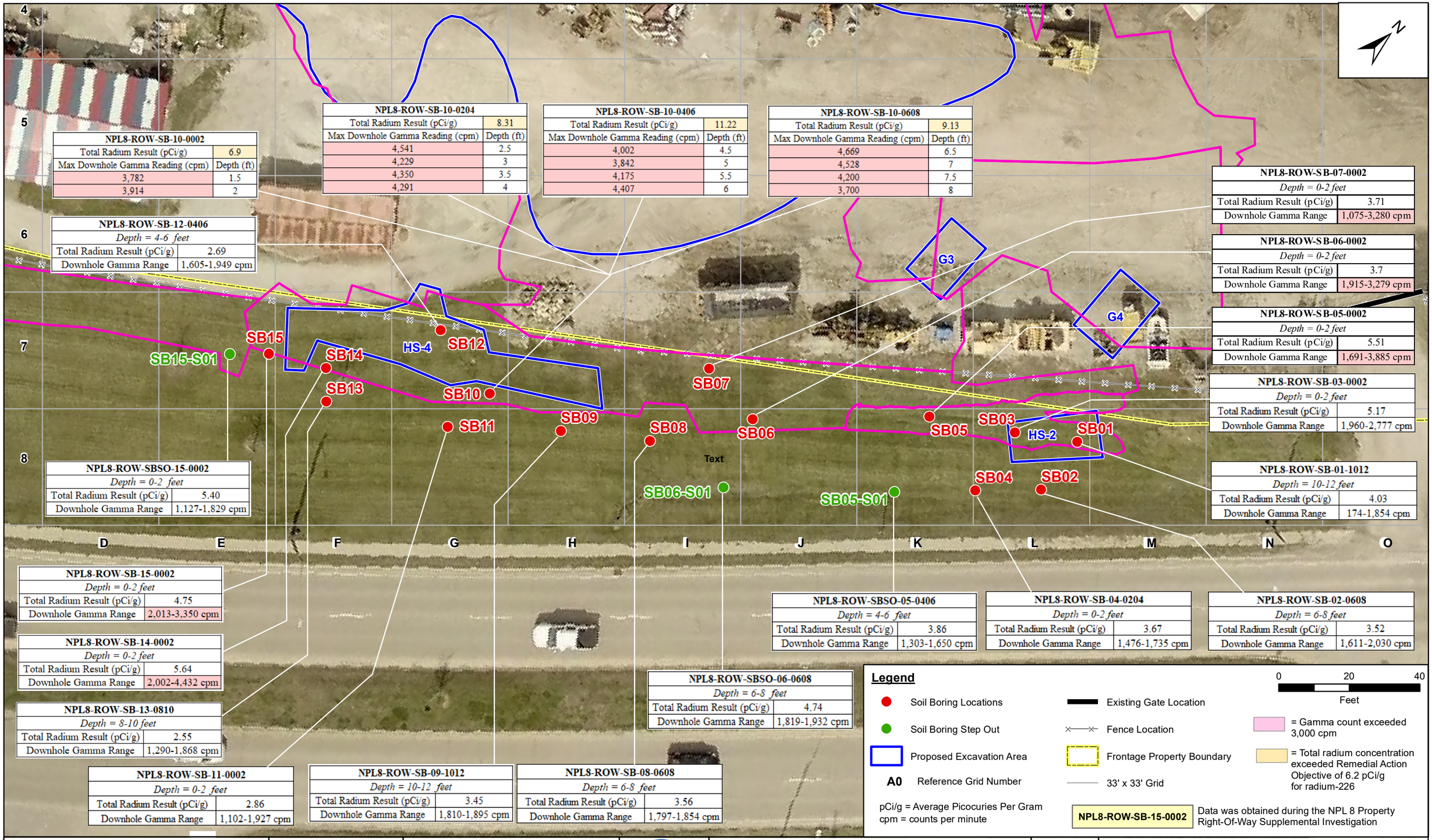
SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 12G
POST-EXCAVATION SIDEWALL SURVEY OF BILL WALSH PROPERTY EXCAVATION SOUTHWEST WALL

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig12G-SidewallSurvey-BW_FinalWall.mxd m.banh



NPL8-ROW-SB-10-0002	
Total Radium Result (pCi/g)	6.9
Max Downhole Gamma Reading (cpm)	Depth (ft)
3,782	1.5
3,914	2

NPL8-ROW-SB-10-0204	
Total Radium Result (pCi/g)	8.31
Max Downhole Gamma Reading (cpm)	Depth (ft)
4,541	2.5
4,229	3
4,350	3.5
4,291	4

NPL8-ROW-SB-10-0406	
Total Radium Result (pCi/g)	11.22
Max Downhole Gamma Reading (cpm)	Depth (ft)
4,002	4.5
3,842	5
4,175	5.5
4,407	6

NPL8-ROW-SB-10-0608	
Total Radium Result (pCi/g)	9.13
Max Downhole Gamma Reading (cpm)	Depth (ft)
4,669	6.5
4,528	7
4,200	7.5
3,700	8

NPL8-ROW-SB-12-0406	
Depth = 4-6 feet	
Total Radium Result (pCi/g)	2.69
Downhole Gamma Range	1,605-1,949 cpm

NPL8-ROW-SB-07-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	3.71
Downhole Gamma Range	1,075-3,280 cpm

NPL8-ROW-SB-06-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	3.7
Downhole Gamma Range	1,915-3,279 cpm

NPL8-ROW-SB-05-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	5.51
Downhole Gamma Range	1,691-3,885 cpm

NPL8-ROW-SB-03-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	5.17
Downhole Gamma Range	1,960-2,777 cpm

NPL8-ROW-SB-01-1012	
Depth = 10-12 feet	
Total Radium Result (pCi/g)	4.03
Downhole Gamma Range	174-1,854 cpm

NPL8-ROW-SBSO-15-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	5.40
Downhole Gamma Range	1,127-1,829 cpm

NPL8-ROW-SB-15-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	4.75
Downhole Gamma Range	2,013-3,350 cpm

NPL8-ROW-SB-14-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	5.64
Downhole Gamma Range	2,002-4,432 cpm

NPL8-ROW-SB-13-0810	
Depth = 8-10 feet	
Total Radium Result (pCi/g)	2.55
Downhole Gamma Range	1,290-1,868 cpm

NPL8-ROW-SB-11-0002	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	2.86
Downhole Gamma Range	1,102-1,927 cpm

NPL8-ROW-SB-09-1012	
Depth = 10-12 feet	
Total Radium Result (pCi/g)	3.45
Downhole Gamma Range	1,810-1,895 cpm

NPL8-ROW-SB-08-0608	
Depth = 6-8 feet	
Total Radium Result (pCi/g)	3.56
Downhole Gamma Range	1,797-1,854 cpm

NPL8-ROW-SBSO-06-0608	
Depth = 6-8 feet	
Total Radium Result (pCi/g)	4.74
Downhole Gamma Range	1,819-1,932 cpm

NPL8-ROW-SBSO-05-0406	
Depth = 4-6 feet	
Total Radium Result (pCi/g)	3.86
Downhole Gamma Range	1,303-1,650 cpm

NPL8-ROW-SB-04-0204	
Depth = 0-2 feet	
Total Radium Result (pCi/g)	3.67
Downhole Gamma Range	1,476-1,735 cpm

NPL8-ROW-SB-02-0608	
Depth = 6-8 feet	
Total Radium Result (pCi/g)	3.52
Downhole Gamma Range	1,611-2,030 cpm

Legend

- Soil Boring Locations
- Soil Boring Step Out
- Proposed Excavation Area
- A0 Reference Grid Number
- Existing Gate Location
- Fence Location
- Frontage Property Boundary
- 33' x 33' Grid
- = Gamma count exceeded 3,000 cpm
- = Total radium concentration exceeded Remedial Action Objective of 6.2 pCi/g for radium-226

0 20 40 Feet

pCi/g = Average Picocuries Per Gram
cpm = counts per minute

NPL8-ROW-SB-15-0002 Data was obtained during the NPL 8 Property Right-Of-Way Supplemental Investigation

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M. BANH
PROJECT NO.	103G18521334
DATE:	APRIL 2021

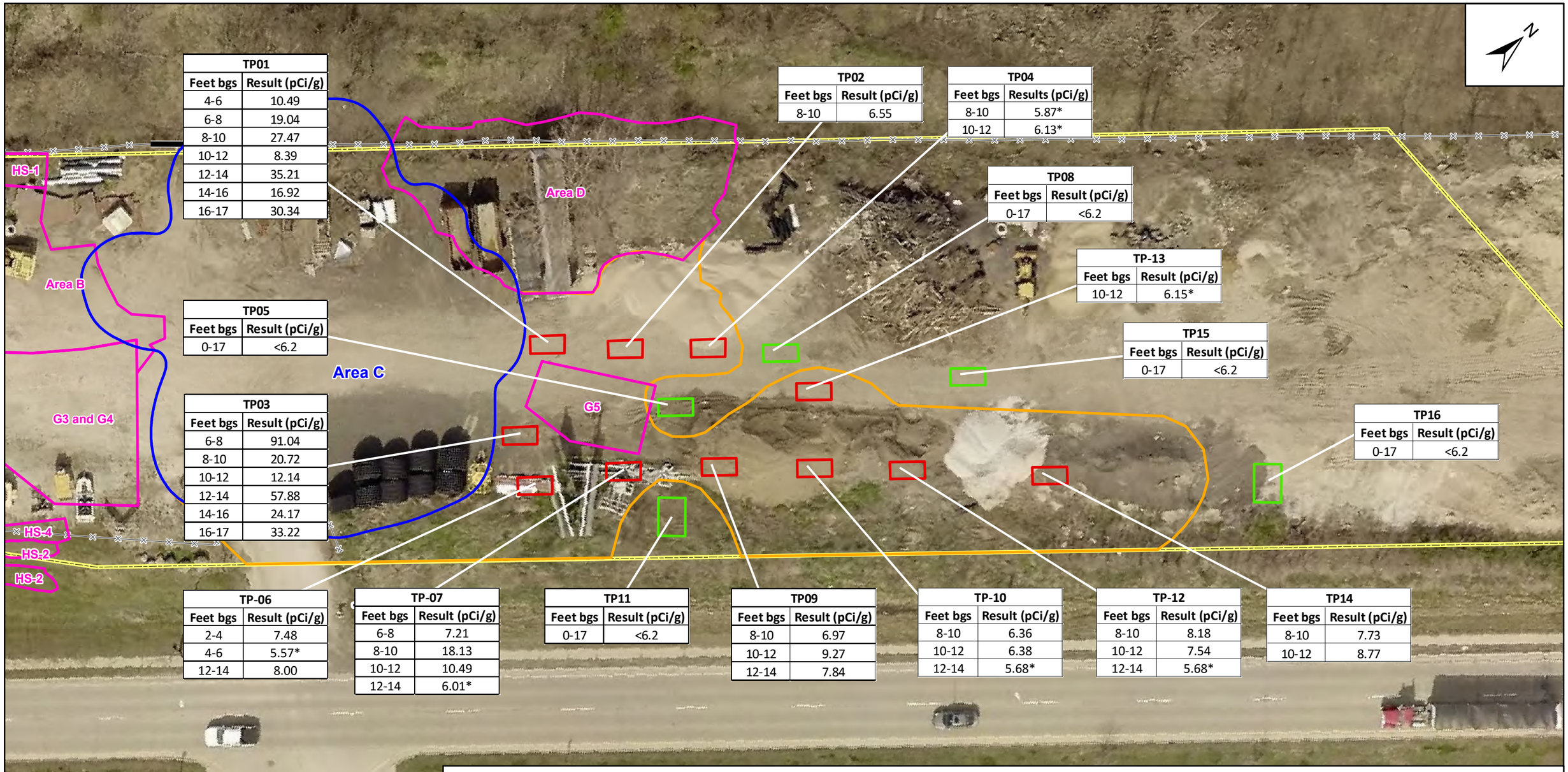
SulTRAC

STATE ROUTE 71 RIGHT-OF-WAY
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 13
SUPPLEMENTAL ROW INVESTIGATION RESULTS - DOWN-HOLE GAMMA SURVEY AND FIELD GAMMA SPECTROSCOPY

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig13-SupplementalROWInvestigationResults.mxd m.banh



TP01	
Feet bgs	Result (pCi/g)
4-6	10.49
6-8	19.04
8-10	27.47
10-12	8.39
12-14	35.21
14-16	16.92
16-17	30.34

TP02	
Feet bgs	Result (pCi/g)
8-10	6.55

TP04	
Feet bgs	Results (pCi/g)
8-10	5.87*
10-12	6.13*

TP08	
Feet bgs	Result (pCi/g)
0-17	<6.2

TP-13	
Feet bgs	Result (pCi/g)
10-12	6.15*

TP15	
Feet bgs	Result (pCi/g)
0-17	<6.2

TP16	
Feet bgs	Result (pCi/g)
0-17	<6.2

TP05	
Feet bgs	Result (pCi/g)
0-17	<6.2

TP03	
Feet bgs	Result (pCi/g)
6-8	91.04
8-10	20.72
10-12	12.14
12-14	57.88
14-16	24.17
16-17	33.22

TP-06	
Feet bgs	Result (pCi/g)
2-4	7.48
4-6	5.57*
12-14	8.00

TP-07	
Feet bgs	Result (pCi/g)
6-8	7.21
8-10	18.13
10-12	10.49
12-14	6.01*

TP11	
Feet bgs	Result (pCi/g)
0-17	<6.2

TP09	
Feet bgs	Result (pCi/g)
8-10	6.97
10-12	9.27
12-14	7.84

TP-10	
Feet bgs	Result (pCi/g)
8-10	6.36
10-12	6.38
12-14	5.68*

TP-12	
Feet bgs	Result (pCi/g)
8-10	8.18
10-12	7.54
12-14	5.68*

TP14	
Feet bgs	Result (pCi/g)
8-10	7.73
10-12	8.77

Frontage Property Boundary

Excavation Boundary

Area C - Based on Figure 7-3 of Remedial Investigation Report (Weston 2003)

Estimated Extended Area C within Frontage Property Boundary - Based on Results of Test Pitting Conducted on 10/16/19 as well as on 05/27/20 through 06/04/20

Existing Gate Location

Fence Location

Total Radium Concentration >6.2 pCi/g

Total Radium Concentration <6.2 pCi/g

pCi/g - Picocuries Per Gram

All results provided are for Total Radium from analysis using on-site gamma spectroscopy

*Average concentration <6.2 pCi/g but 1 of 2 on-site lab aliquot result was >6.2 pCi/g

0 25 50

Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G18521334
DATE: APRIL 2021	APRIL 2021

SulTRAC

STATE ROUTE 71 RIGHT-OF-WAY
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 14
ESTIMATED EXTENDED AREA C WITH INVESTIGATIVE TEST PIT LOCATIONS AND RESULTS - FIELD GAMMA SPECTROSCOPY

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig14-AreaC-TestPitLocations.mxd m.banh

TP-08			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	**13.35**	5,800	11,400
2-4	4.37	7,000	7,800

TP-06			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	**9.58**	4,400	17,500
2-4	**11.33**	9,100	7,300

TP-04			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	**7.07**	4,800	11,800
2-4	**6.64**	7,500	6,600

TP-03			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	5.37	4,400	21,600
2-4	**15.46**	7,400	11,800

TP-01			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	4.32	4,900	10,800
2-4	**10.50**	7,100	8,800

TP-09			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	4.03	4,300	5,900
2-4	4.01	4,400	6,300

TP-07			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	3.01	4,400	4,800
2-4	3.16	3,900	5,100

TP-05			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	3.19	3,500	5,200
2-4	4.07	3,400	5,100

TP-02			
Depth (feet)	Average Radium 226 Concentrations (pCi/g)	Pile Activity (CPM)	Activity in Test Pit (CPM)
0-2	3.22	4,600	5,200
2-4	2.67	3,800	5,300

5 6 7 8

A' A B C D E F

HS-4

Legend

- Test Pit Location (4' x 4')
- Estimated ROW Spring 2020 excavation area to a depth of at least 0-2 ft bgs
- Estimated ROW Spring 2020 excavation area to a depth of at least 0-4 ft bgs
- Actual Excavation Area
- Proposed Excavation Area
- Frontage Property Boundary
- Existing Gate Location
- Proposed Gate Location
- Fence Location
- 33' x 33' Grid
- **A0** Reference Grid Number
- **XXXX** Radium 226 concentration exceeded Remedial Action Objective of 6.2 pCi/g

pCi/g - Picocuries Per Gram
CPM - Counts Per Minute

0 10 20
Feet

Source: Bing Map-GIS online map server

DESIGNED:	K. SCHNOES
DRAWN:	M.BANH
PROJECT NO.	103G18521334
DATE:	APRIL 2021

SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 15
ESTIMATED EXTENT OF REMAINING ROW CONTAMINATION WITH INVESTIGATIVE TEST PIT LOCATIONS AND RESULTS - GAMMA SURVEY AND FIELD GAMMA SPECTROSCOPY

3/25/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig15-TestPitLocations_Results.mxd m.banh

A' A B C

0 1 2 3 4 5 6 7

Area A

Area A-Extended

Area B

G1-Extended

G1

Bill Walsh

ROW 2020

Gamma Survey - Counts per minute (cpm)

- 0 - 6,500 cpm
- 6,500 - 10,000 cpm
- > 10,000 cpm

- Proposed Excavation Area
- Final Excavation Area
- Bill Walsh Property Excavation Area
- Frontage Property Boundary
- Approximate Bill Walsh Property Boundary
- Fence Location
- 33' x 33' Grid
- **A0** Reference Grid Number

0 25 50
Feet

Source: Bing Map-GIS online map server

DESIGNED:	K. SCHNOES
DRAWN:	M.BANH
PROJECT NO.	103G18521334
DATE:	APRIL 2021

SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 16
BILL WALSH PROPERTY INVESTIGATIVE GAMMA WALKOVER SURVEY

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig16-BWPropertyGammaSurvey.mxd m.banh

BW-SB-08	
Total Radium Result (pCi/g)	*Depth (ft)*
9.43	2
6.76	2.5
Max Downhole Gamma Reading (cpm)	*Depth (ft)*
2,868	2
2,994	2.5

BW-SB-10	
Depth = 3.5 feet	
Max Total Radium Result (pCi/g)	**4.37**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**681-1,975**

BW-SB-02	
Depth = 4 feet	
Max Total Radium Result (pCi/g)	**4.33**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**860-1,908**

BW-SB-01	
Total Radium Result (pCi/g)	*Depth (ft)*
7.38	2
23.90	2.5
32.11	3
5.23	3.5
Max Downhole Gamma Reading (cpm)	*Depth (ft)*
5,273	2
7,643	2.5
13,985	3
5,873	3.5

BW-SB-04	
Depth = 1.5 feet	
Max Total Radium Result (pCi/g)	**4.84**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**716-1,836**

BW-SB-11	
Depth = 6.5 feet	
Max Total Radium Result (pCi/g)	**3.89**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**660-1,808**

BW-SB-06	
Total Radium Result (pCi/g)	*Depth (ft)*
16.94	2.5
4.97	3
Max Downhole Gamma Reading (cpm)	*Depth (ft)*
4,087	2.5
3,446	3

BW-SB-12	
Depth = 2.5 feet	
Max Total Radium Result (pCi/g)	**4.68**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**1,321-2,066**

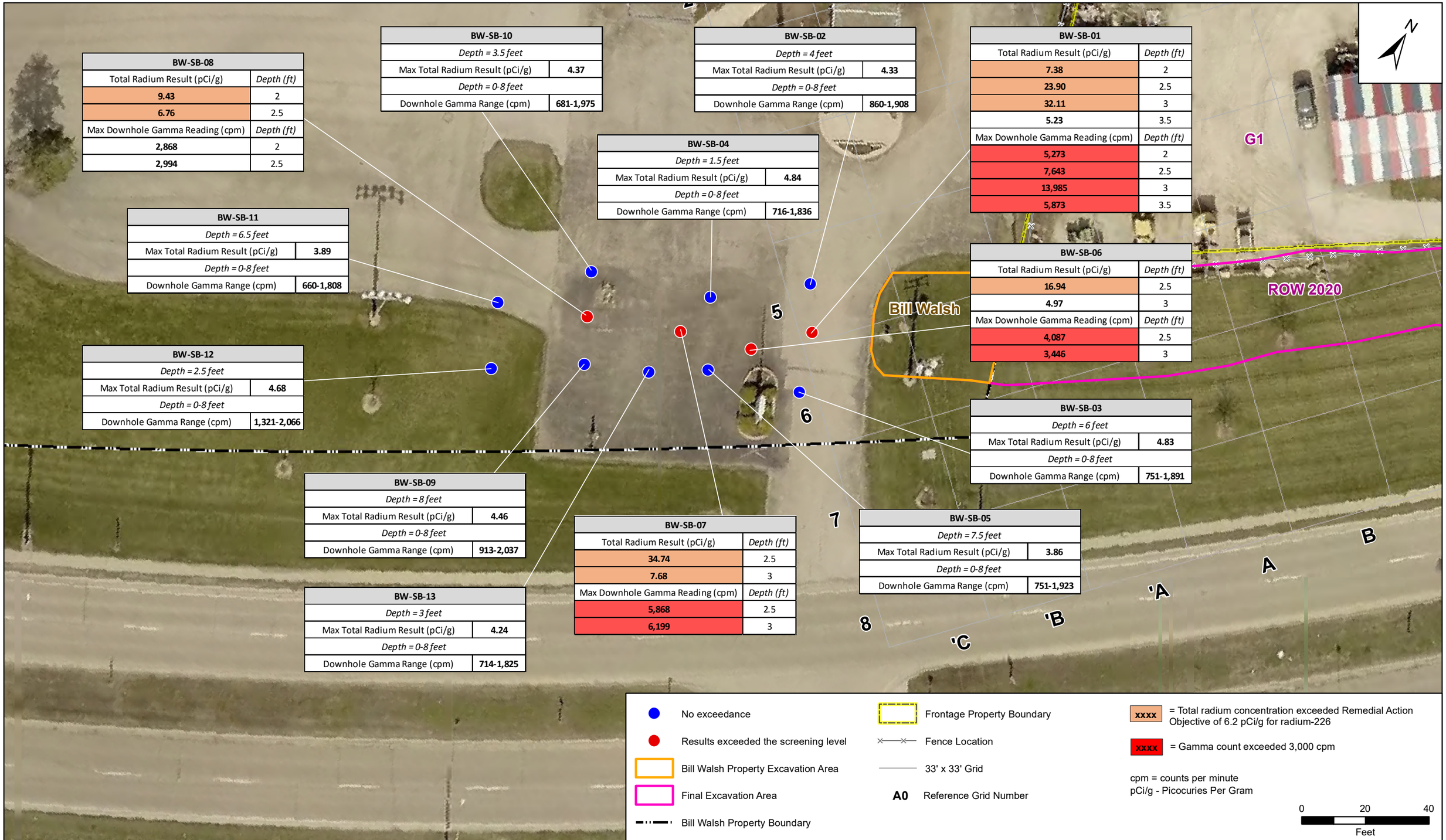
BW-SB-03	
Depth = 6 feet	
Max Total Radium Result (pCi/g)	**4.83**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**751-1,891**

BW-SB-09	
Depth = 8 feet	
Max Total Radium Result (pCi/g)	**4.46**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**913-2,037**

BW-SB-07	
Total Radium Result (pCi/g)	*Depth (ft)*
34.74	2.5
7.68	3
Max Downhole Gamma Reading (cpm)	*Depth (ft)*
5,868	2.5
6,199	3

BW-SB-05	
Depth = 7.5 feet	
Max Total Radium Result (pCi/g)	**3.86**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**751-1,923**

BW-SB-13	
Depth = 3 feet	
Max Total Radium Result (pCi/g)	**4.24**
Depth = 0-8 feet	
Downhole Gamma Range (cpm)	**714-1,825**



- No exceedance
- Results exceeded the screening level
- Bill Walsh Property Excavation Area
- Final Excavation Area
- Bill Walsh Property Boundary
- Frontage Property Boundary
- Fence Location
- 33' x 33' Grid
- A0 Reference Grid Number
- xxxx = Total radium concentration exceeded Remedial Action Objective of 6.2 pCi/g for radium-226
- xxxx = Gamma count exceeded 3,000 cpm

cpm = counts per minute
pCi/g - Picocuries Per Gram

0 20 40
Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G18521334
DATE:	APRIL 2021

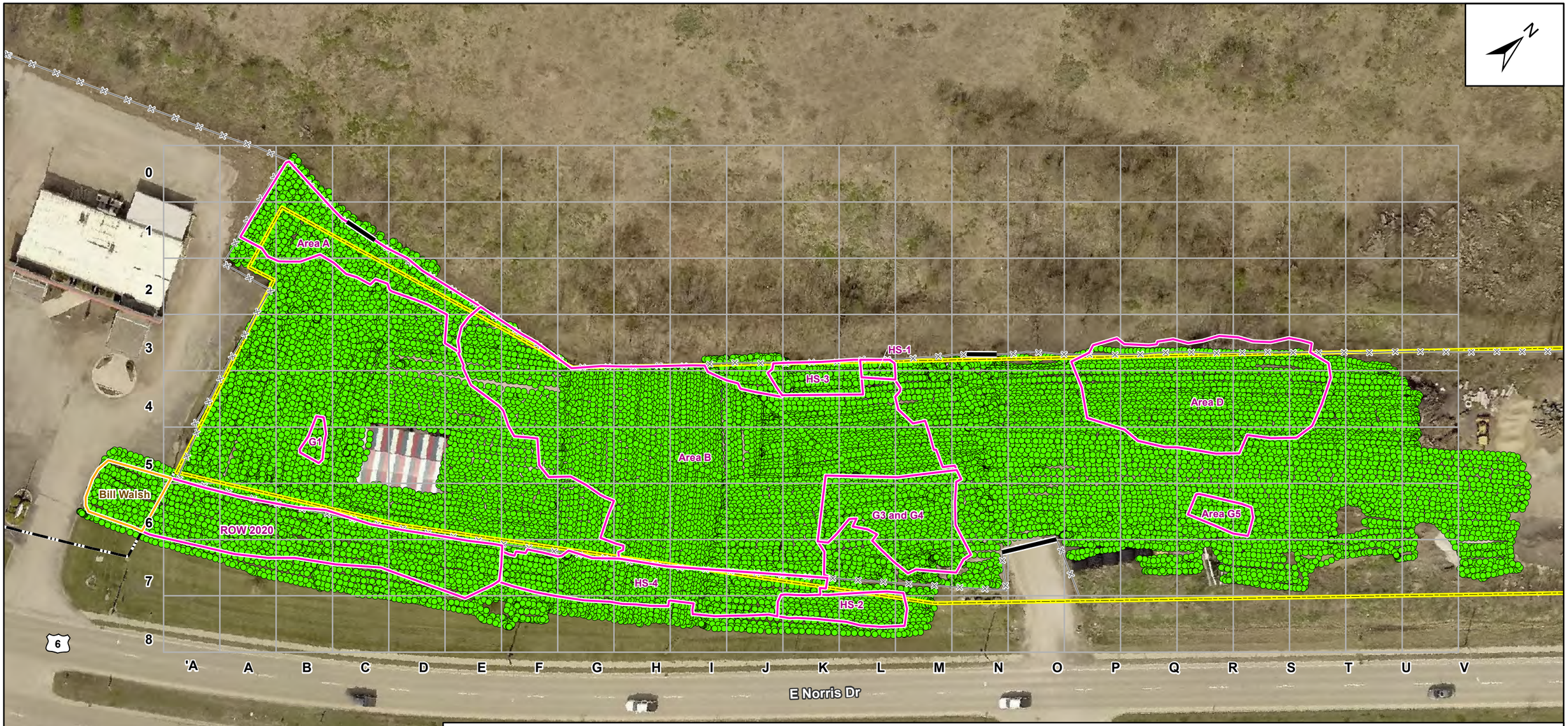
SulTRAC

STATE ROUTE 71 RIGHT-OF-WAY
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 17
BILL WALSH PROPERTY INVESTIGATION RESULTS - DOWN-HOLE GAMMA SURVEY AND FIELD GAMMA SPECTROSCOPY

4/15/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig17-BWPropertyInvestigationResults.mxd m.banh



Bill Walsh Excavation Area Boundary

Actual Excavation Area

'Frontage Property Boundary

Existing Gate Location

Fence Location

Spring 2020 ROW

33' x 33' Grid

A0 Reference Grid Number

Gamma Survey

- 0 - 6,500 cpm
- 6,501 - 10,000 cpm
- > 10,000 cpm

cpm = counts per minute

0 50 100

Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

SulTRAC

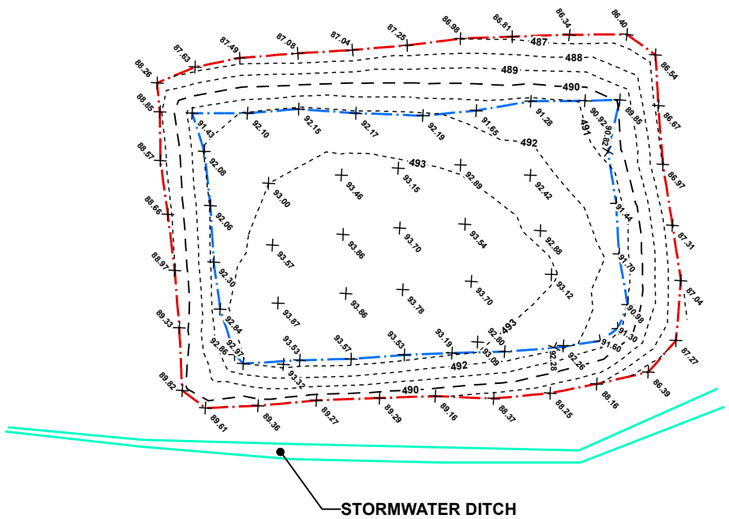
STATE ROUTE 71 RIGHT-OF-WAY
NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

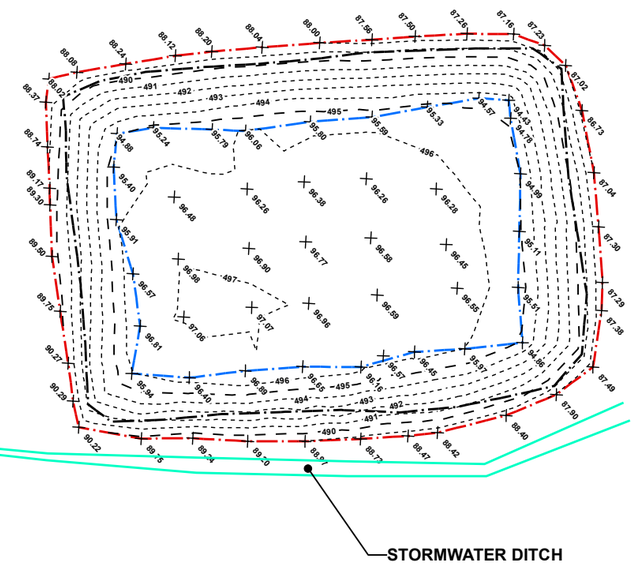
FIGURE 18
POST-BACKFILL SURFACE GAMMA WALKOVER SURVEY

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig18-PostBackfillSurfaceGammaSurvey.mxd m.banh

PRE-CAP INSTALLATION



POST-CAP INSTALLATION



Stockpile Contaminated Soil Survey drawing is provided by Renwick & Associates, Inc.
20200817 saved ACAD ver 2013 (#18.206.1) for TriEco, LLC - NPL-8 Site -Stockpile Contaminated Soil Survey.dwg

Stockpile Final Grading Survey drawing is provided by Renwick & Associates, Inc.
20200818 saved ACAD ver 2013 (#18.206.1) for TriEco, LLC - NPL-8 Site -Stockpile Final Grading Survey.dwg

- Frontage Property Boundary
- Approximate Landfill Boundary
- Fence Location
- Existing Gate Location
- Contour Line - 5 feet interval
- Contour Line - 1 foot interval
- Toe of Slope
- Top of Slope
- 87.55 Spot Elevation (add 400)

0 25 50
Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	FEBRUARY 2021

SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 19
COMPACTED CONTAMINATED SOIL STOCKPILE GRADES

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig19-Pre_Post_CapStockpile.mxd m.banh

PRE-CAP INSTALLATION

STORMWATER DITCH

POST-CAP INSTALLATION

STORMWATER DITCH

Frontage Property Boundary
Approximate Landfill Boundary
Fence Location
Existing Gate Location
Toe of Slope
Top of Slope

Gamma Survey
0 - 6,500 cpm
6,501 - 10,000 cpm
> 10,000 cpm
cpm = counts per minute

0 25 50
Feet

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

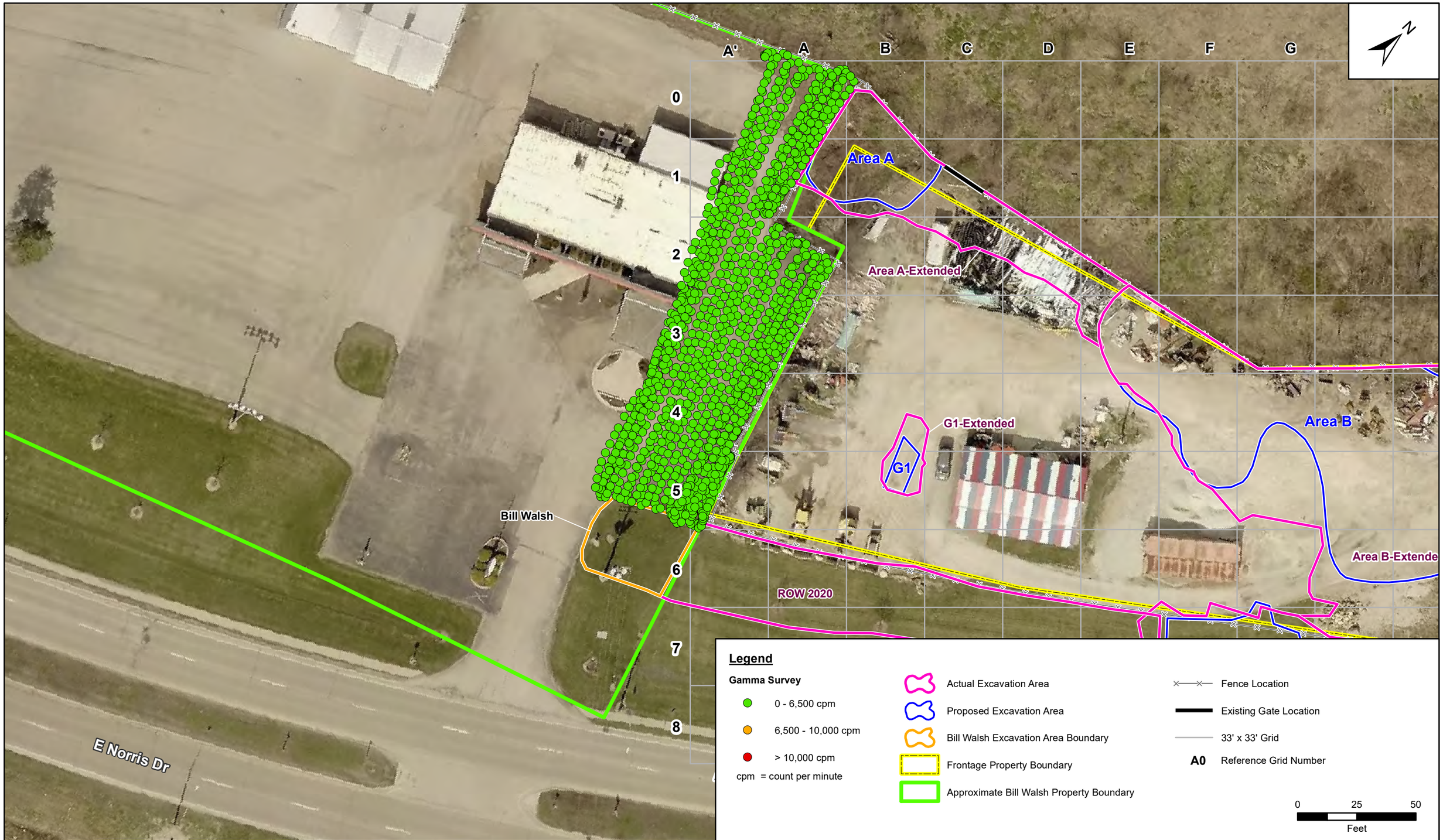
SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 20
COMPACTED CONTAMINATED SOIL STOCKPILE
GAMMA WALKOVER SURVEY

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig20-Contaminted_ConstructedSoilGamma.mxd m.banh



Legend

Gamma Survey

- 0 - 6,500 cpm
- 6,500 - 10,000 cpm
- > 10,000 cpm

cpm = count per minute

- Actual Excavation Area
- Proposed Excavation Area
- Bill Walsh Excavation Area Boundary
- Frontage Property Boundary
- Approximate Bill Walsh Property Boundary
- Fence Location
- Existing Gate Location
- 33' x 33' Grid
- A0 Reference Grid Number

0 25 50
Feet

Source: Bing Map-GIS online map server

DESIGNED:	K. SCHNOES
DRAWN:	M.BANH
PROJECT NO.	103G18521334
DATE:	SEPTEMBER 2020

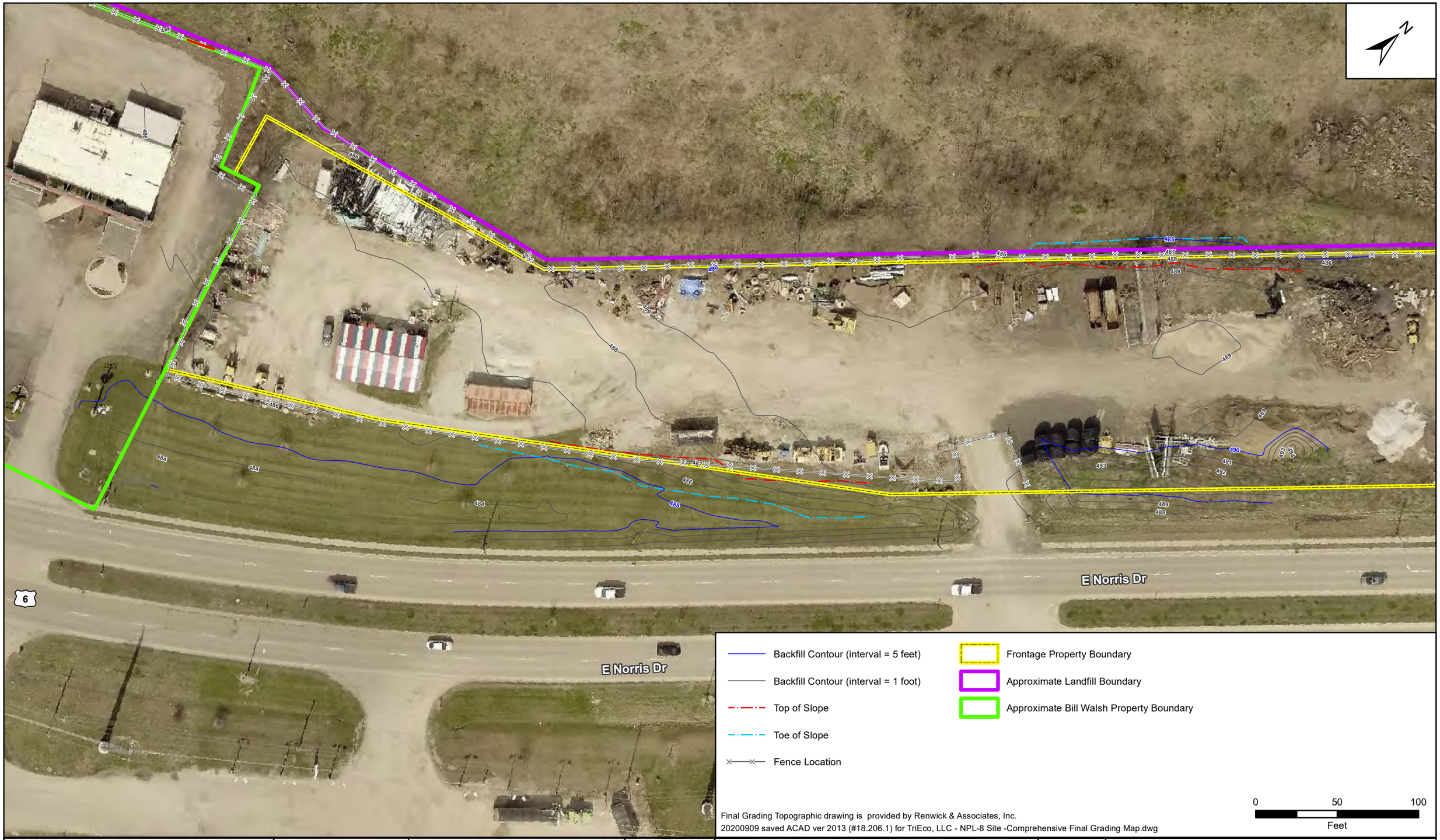
SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 21
POST-EXCAVATION REMAINING CONTAMINATION DOCUMENTATION - BILL WALSH PROPERTY PERSONNEL PARKING AREA

4/14/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig21-BWPropertyPostExcavationGammaSurvey.mxd m.banh



Final Grading Topographic drawing is provided by Renwick & Associates, Inc.
20200909 saved ACAD ver 2013 (#18.206.1) for TriEco, LLC - NPL-8 Site -Comprehensive Final Grading Map.dwg

Source: Bing Map-GIS online map server

DESIGNED:	P. PALLARDY
DRAWN:	M.BANH
PROJECT NO.	103G1852334
DATE:	APRIL 2021

SulTRAC

NPL-8 FRONTAGE PROPERTY SITE
OTTAWA, ILLINOIS
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

SCALES:
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: N/A

FIGURE 22
FINAL GRADE AS-BUILT DRAWING

4/12/2021 G:\G\1852\197 Ottawa Radiation - RA\mxd\2021-04 NPL8 Report\Fig22-FinalGradeAs-Built.mxd m.banh

APPENDIX B

TABLES

Table 1
Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Soil Pile Sample ID	Date	Field Laboratory Gamma Spec Result (pCi/g)[2]
B1-9	7/23/2019	18.24
C1-1	7/24/2019	18.94
C1-2	7/24/2019	12.92
C1-5	7/24/2019	9.68
C1-6	7/25/2019	11.39
C1-8	7/25/2019	10.92
C1-10	7/25/2019	7.62
C1-11	7/25/2019	8.72
C1-12	7/26/2019	9.53
D1-1	7/26/2019	7.91
D2-1	7/26/2019	6.52
D2-3	7/26/2019	4.88
D2-6	7/26/2019	8.82
D2-9	7/26/2019	6.99
D2-10	7/26/2019	5.02
E3-2	7/29/2019	7.41
E3-3	7/29/2019	5.64
E3-7	7/29/2019	6.34
F3-1	7/29/2019	9.43
F3-4	7/29/2019	8.01
F3-5	7/29/2019	26.46
G4-2	7/30/2019	8.34
G4-3	7/30/2019	8.48
H4-2	7/30/2019	15.13
H4-3	7/30/2019	6.86
H4-5	7/30/2019	13.60
H4-6	7/30/2019	7.43
H4-7	7/30/2019	6.76
H4-8	7/30/2019	6.78
G4-10	7/31/2019	10.53
H4-11	7/31/2019	4.61
I4-2	8/1/2019	5.86
H4-13	8/1/2019	11.16
H4-14	8/1/2019	5.78
I4-5	8/1/2019	12.33
I4-8	8/1/2019	9.26
J4-4	8/2/2019	8.28
J4-6	8/2/2019	8.53
K3-1	8/2/2019	9.58
K3-2	8/2/2019	5.85
K4-2	8/2/2019	8.00
K4-8	8/5/2019	16.46
K4-9	8/5/2019	18.06
K4-11	8/5/2019	6.74
L4-1	8/5/2019	22.19
M7-1	8/6/2019	23.35
M7-3	8/6/2019	20.19
M6-1	8/6/2019	9.52
M6-2	8/6/2019	7.55
M6-5	8/6/2019	15.96
M6-6	8/6/2019	20.49
M6-7	8/6/2019	34.72
M6-9	8/7/2019	30.89
L6-1	8/7/2019	21.40
L6-2	8/7/2019	10.39
L8-2	8/8/2019	6.81
L6-5	8/9/2019	7.96
L6-6	8/9/2019	5.93
K8-2	8/12/2019	5.74
K8-4	8/12/2019	5.75
K6-2	8/12/2019	7.67
M6-11	8/13/2019	11.84
L6-11	8/13/2019	36.62
L6-12	8/13/2019	29.33
M6-13	8/14/2019	10.94
M6-15	8/14/2019	8.72
M6-16	8/14/2019	8.56
M7-5	8/15/2019	19.62
M7-6	8/15/2019	6.70
M7-7	8/15/2019	11.53

Table 1
Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Soil Pile Sample ID	Date	Field Laboratory Gamma Spec Result (pCi/g)[2]
J5-2	8/16/2019	7.23
I5-1	8/16/2019	7.10
I5-2	8/16/2019	6.93
H5-4	8/21/2019	8.09
G5-2	8/21/2019	6.17
H5-5	8/21/2019	5.89
H5-7	8/21/2019	8.59
H5-9	8/21/2019	7.54
J5-2	8/22/2019	5.73
J5-3	8/22/2019	9.76
J5-4	8/22/2019	7.34
H6-2	8/22/2019	7.62
I6-1	8/22/2019	7.45
I6-3	8/22/2019	5.97
F4-2	8/23/2019	14.58
G5-6	8/23/2019	8.42
F4-10	8/27/2019	5.89
H5-11	8/27/2019	5.19
H6-3	8/27/2019	7.17
H6-4	8/27/2019	10.84
H6-6	8/27/2019	6.65
I6-6	8/27/2019	8.65
I6-7	8/27/2019	7.23
I6-9	8/28/2019	6.12
K5-3	9/4/2019	6.98
H6-8	9/4/2019	10.41
I6-10	9/4/2019	9.38
I6-12	9/4/2019	7.67
H6-12	9/5/2019	9.85
G7-1	9/5/2019	12.53
G7-2	9/5/2019	8.19
G7-3	9/5/2019	10.40
H7-2	9/5/2019	5.50
I7-1	9/5/2019	4.85
I7-3	9/10/2019	6.13
I7-6	9/10/2019	7.68
J7-4	9/10/2019	5.94
J7-5	9/10/2019	6.67
J7-9	9/10/2019	7.89
J7-11	9/11/2019	6.55
S4-25	9/19/2019	8.88
S4-26	9/19/2019	38.74
S4-27	9/19/2019	16.54
S4-28	9/19/2019	32.98
S4-29	9/19/2019	10.01
S4-30	9/19/2019	22.72
S4-32	9/19/2019	73.22
S4-31	9/19/2019	91.82
S3-4	9/20/2019	36.62
S3-5	9/20/2019	43.90
S3-6	9/20/2019	67.62
S3-7	9/20/2019	19.12
S3-8	9/20/2019	18.79
R3-6	9/20/2019	7.86
R3-7	9/20/2019	7.60
R3-8	9/20/2019	6.41
R3-9	9/20/2019	5.89
R3-13	9/23/2019	59.14
R3-14	9/23/2019	105.50
R3-16	9/23/2019	289.08
R3-15	9/23/2019	148.32
R3-17	9/23/2019	102.49
R3-18	9/23/2019	74.11
R3-19	9/23/2019	43.65
R3-20	9/23/2019	16.76
R3-21	9/23/2019	427.00
R3-22	9/23/2019	30.07
R3-23	9/23/2019	6.58
S3-9	9/24/2019	14.73
S3-10	9/24/2019	7.03
S3-11	9/24/2019	10.67
S3-12	9/24/2019	57.30
S3-13	9/24/2019	20.89
S3-14	9/24/2019	59.52

Table 1
Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Soil Pile Sample ID	Date	Field Laboratory Gamma Spec Result (pCi/g)[2]
S3-15	9/24/2019	401.15
R3-24	9/24/2019	189.23
R3-25	9/24/2019	62.20
R3-26	9/24/2019	10.76
S3-18	9/25/2019	7.12
Q3-3	9/25/2019	25.55
S4-34	9/25/2019	5.43
R4-18	9/26/2019	6.62
R4-19	9/26/2019	12.45
S4-41	9/26/2019	5.95
R4-22	9/26/2019	6.65
Q3-9	9/27/2019	32.76
Q3-10	9/27/2019	7.06
Q3-11	9/30/2019	7.75
Q3-12	9/30/2019	16.44
S4-46	9/30/2019	8.21
S4-47	10/1/2019	5.82
R4-24	10/1/2019	6.78
R4-25	10/1/2019	13.07
R4-26	10/1/2019	9.47
R4-27	10/1/2019	10.34
R4-28	10/1/2019	7.44
R4-29	10/2/2019	37.97
Q3-17	10/2/2019	6.60
Q4-3	10/2/2019	6.80
Q4-4	10/2/2019	12.90
Q4-5	10/2/2019	20.51
Q3-19	10/2/2019	6.78
R4-31	10/2/2019	14.68
R4-32	10/2/2019	8.55
Q4-10	10/2/2019	6.90
Q3-20	10/2/2019	742.64
Q3-21	10/3/2019	123.08
Q3-22	10/3/2019	110.57
Q3-23	10/3/2019	22.85
Q4-11	10/4/2019	5.77
Q4-14	10/4/2019	11.99
P3-8	10/4/2019	14.32
P3-9	10/4/2019	20.76
P3-10	10/4/2019	28.96
R4-38	10/7/2019	157.74
R4-39	10/7/2019	157.53
R4-40	10/7/2019	38.35
R4-41	10/7/2019	152.95
R5-1	10/7/2019	8.73
R5-4	10/7/2019	5.42
Q3-24	10/10/2019	14.15
Q3-25	10/10/2019	44.88
Q3-28	10/10/2019	22.25
Q3-29	10/10/2019	14.18
Q3-30	10/10/2019	14.93
Q3-31	10/10/2019	24.16
Q3-26	10/10/2019	19.50
Q3-27	10/10/2019	39.81
R4-42	10/11/2019	56.66
R4-43	10/11/2019	15.18
R4-44	10/11/2019	7.27
R4-45	10/11/2019	8.39
R4-46	10/11/2019	12.82
R4-48	10/11/2019	11.81
R4-49	10/11/2019	10.93
R4-50	10/11/2019	7.25
R4-51	10/11/2019	27.35
P3-11	10/14/2019	23.88
P3-13	10/14/2019	8.47
P3-14	10/14/2019	18.97
P4-1	10/14/2019	24.74
P4-2	10/14/2019	9.14
Q4-15	10/14/2019	7.12
P4-3	10/14/2019	44.36
P4-4	10/14/2019	20.31

Table 1
Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Soil Pile Sample ID	Date	Field Laboratory Gamma Spec Result (pCi/g)[2]
Q4-18	10/14/2019	8.04
Q4-19	10/14/2019	27.59
R5-5	10/15/2019	6.78
R5-7	10/15/2019	10.96
R5-8	10/15/2019	7.10
R5-9	10/15/2019	12.93
R4-52	10/15/2019	6.64
R4-53	10/15/2019	8.79
R4-54	10/15/2019	13.38
R4-55	10/15/2019	144.09
R5-10	10/15/2019	8.42
R5-11	10/15/2019	24.31
R4-57	10/15/2019	136.04
R4-58	10/15/2019	46.65
R4-59	10/15/2019	18.52
R4-60	10/15/2019	30.75
R4-61	10/15/2019	13.54
R4-62	10/15/2019	52.00
R4-63	10/15/2019	29.36
R4-64	10/15/2019	14.22
R4-65	10/15/2019	9.79
Area D-FS	10/17/2019	10.97
Q4-20	10/17/2019	15.12
Q4-21	10/17/2019	17.98
Q4-22	10/17/2019	27.85
Q4-23	10/17/2019	17.92
Q4-24	10/17/2019	74.40
Q4-25	10/17/2019	233.81
Q4-26	10/17/2019	21.70
Q4-27	10/17/2019	16.36
Q4-28	10/17/2019	10.12
Q4-29	10/17/2019	17.15
Q4-30	10/17/2019	13.68
P3-15	10/18/2019	7.16
Area D-FS-6	10/18/2019	9.01
Area D-FS-7	10/18/2019	27.34
R4-68	10/22/2019	8.25
Q3-32	10/22/2019	8.71
P3-16	10/22/2019	6.89
L8-14	10/23/2019	5.56
K8-5	10/24/2019	7.78
K8-6	10/24/2019	6.51
K8-7	10/24/2019	5.66
K8-8	10/24/2019	8.03
K8-10	10/24/2019	6.88
J7-15	10/24/2019	8.41
J7-17	10/25/2019	5.77
J7-18	10/25/2019	6.02
I7-8	10/25/2019	6.96
I7-11	10/28/2019	5.96
I7-13	10/28/2019	6.72
I7-14	10/28/2019	9.21
H7-5	10/28/2019	6.27
J8-1	10/29/2019	8.47
J8-3	10/30/2019	8.61
J8-4	10/30/2019	6.73
J8-5	10/30/2019	6.41
J8-6	10/30/2019	7.71
J8-7	10/30/2019	10.36
I8-1	10/30/2019	9.11
I8-2	10/3/2019	6.03
I8-3	10/31/2019	7.79
I8-4	10/31/2019	8.03
I8-5	10/31/2019	6.10
I8-7	10/31/2019	6.45
H7-6	10/31/2019	7.21
H7-8	11/1/2019	8.11
H7-9	11/1/2019	8.15
H7-10	11/1/2019	7.09
H7-11	11/1/2019	11.19
H7-12	11/4/2019	8.27
H7-13	11/4/2019	12.57
H7-14	11/4/2019	5.62

Table 1
Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Soil Pile Sample ID	Date	Field Laboratory Gamma Spec Result (pCi/g)[2]
H7-15	11/4/2019	9.32
H7-16	11/4/2019	14.86
H7-17	11/4/2019	10.62
H7-18	11/4/2019	6.79
H7-19	11/4/2019	13.91
E7-1	11/5/2019	15.17
E7-2	11/5/2019	13.97
E7-3	11/5/2019	9.22
F7-1	11/6/2019	18.78
F7-3	11/6/2019	24.05
F7-4	11/6/2019	15.76
F7-5	11/7/2019	8.30
F7-6	11/7/2019	5.19
F7-7	11/7/2019	6.97
F7-9	11/7/2019	12.39
F7-10	11/7/2019	22.42
G7-4	11/7/2019	8.99
G7-5	11/7/2019	7.07
G7-6	11/8/2019	14.90
G7-7	11/8/2019	4.14
G7-8	11/8/2019	7.09
G7-9	11/8/2019	6.22
G7-10	11/8/2019	9.47
G7-11	11/8/2019	12.29
G7-13	11/11/2019	24.77
G7-14	11/11/2019	19.97
G7-15	11/11/2019	14.03
G7-16	11/11/2019	8.82
G7-17	11/11/2019	8.80
K5-5	11/13/2019	4.86
L5-2	11/14/2019	9.16
L5-3	11/14/2019	10.85
L5-4	11/14/2019	45.61
L5-5	11/14/2019	16.57
L5-6	11/14/2019	11.04
L5-8	11/14/2019	10.97
L5-9	11/14/2019	14.03
L5-10	11/15/2019	11.96
L5-12	11/15/2019	10.44
M5-1	11/15/2019	18.24
M5-2	11/15/2019	10.81
M5-4	11/15/2019	8.04
M5-5	11/15/2019	7.29
M5-6	11/15/2019	9.66
M5-7	11/15/2019	13.04
M5-8	11/15/2019	10.77
M5-10	11/15/2019	14.75
M5-12	11/18/2019	7.81
M5-13	11/18/2019	6.92
L4-3	11/18/2019	13.14
L4-4	11/18/2019	9.67
L4-7	11/18/2019	15.31
L4-8	11/18/2019	8.03
L4-9	11/18/2019	6.90
G7-21	11/25/2019	7.27
G7-24	11/25/2019	7.26
E7-5	5/4/2020	6.28
E7-7	5/4/2020	16.07
E7-8	5/4/2020	19.75
E7-9	5/6/2020	7.56
E7-10	5/6/2020	6.19
E7-11	5/6/2020	6.48
E7-12	5/6/2020	8.42
E7-13	5/6/2020	8.32
D7-1	5/6/2020	7.52
D7-3	5/7/2020	8.12
D7-5	5/7/2020	11.55
D7-6	5/7/2020	6.41
D7-8	5/7/2020	8.20
C7-1	5/8/2020	6.04
C7-3	5/8/2020	6.77

Table 1
Field Gamma Spectroscopy Results for Stockpiled Contaminated Soil Piles
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Soil Pile Sample ID	Date	Field Laboratory Gamma Spec Result (pCi/g)[2]
A'6-2	5/8/2020	13.27
A'6-3	5/11/2020	13.22
A'6-4	5/11/2020	8.05
A'6-5	5/11/2020	7.10
A'6-6	5/11/2020	9.28
A'6-7	5/11/2020	9.00
A'6-8	5/12/2020	8.12
A'6-9	5/12/2020	12.38
A'6-10	5/12/2020	15.16
A'6-11	5/12/2020	15.41
A6-1	5/13/2020	11.10
A6-2	5/13/2020	6.17
A6-4	5/13/2020	20.11
A6-5	5/13/2020	11.30
A6-6	5/19/2020	8.12
A6-7	5/19/2020	10.41
A6-8	5/19/2020	6.09
A6-9	5/19/2020	10.45
C6-2	5/19/2020	5.99
C6-3	5/19/2020	6.03
B6-1	5/20/2020	6.41
B6-2	5/20/2020	6.66
B6-3	5/20/2020	5.93
B6-4	5/20/2020	5.03
B6-5	5/20/2020	9.42
B6-8	5/21/2020	6.42
B6-9	5/21/2020	7.72
B6-10	5/21/2020	6.17
B6-12	5/26/2020	4.56
B6-13	5/26/2020	3.54
B'6-1	6/12/2020	8.65
B'6-2	6/12/2020	7.59
B'6-3	6/12/2020	6.14
B'6-4	6/15/2020	6.42
B'6-5	6/15/2020	5.09
B'6-6	6/15/2020	5.32
B'6-7	6/15/2020	18.73
B'5-1	6/16/2020	20.23
B'5-2	6/16/2020	12.47
B'5-3	6/16/2020	9.07
B'5-5	6/16/2020	12.70
B'5-6	6/16/2020	6.23
B'5-7	6/16/2020	7.73
B'6-8	6/17/2020	15.16
B'6-9	6/17/2020	6.68
B'6-10	6/17/2020	5.84
B'6-11	6/17/2020	8.55
B'6-12	6/17/2020	8.59
B'6-13	6/17/2020	8.69
B'6-14	6/18/2020	6.24
C'6-1	6/18/2020	3.57

Notes:

Area D-FS	A soil pile generated from overexcavation of the excavation floor of Area D.
Gamma Spec	Gamma spectroscopy
pCi/g	Picocuries per gram

1 - Soil Pile Sample ID nomenclature includes the grid number and a running count of the total soil piles excavated from that grid. For example the 9th soil pile excavated from grid B1 would be labeled B1-9.

2 - On-site field laboratory analytical results include radium-226 plus radium-228.

Table 2
Excavation Volume Variance
Remedial Design Volumes Versus Final Volumes
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Area	REMEDIAL DESIGN VOLUMES			ACTUAL VOLUMES THRU 06/18/2020 (Based on Final Surveyed Volumes)			EXCAVATION VOLUME VARIANCE		
	Clean Soil (CY)	Contaminated Volume (CY)	Total Volume (CY)	Volume of Clean (CY)	Volume of Contaminated (CY)	Total Volume Excavated (CY)	% of Design Volume Excavated - Clean	% of Design Volume Excavated - Contaminated	% of Design Volume Excavated - Total
A	1,129	600	1,729	356	97	452	32%	16%	26%
G-1	288	89	377	12	0	12	4%	0%	3%
B	1,613	1,261	2,874	1,013	586	1,599	63%	46%	56%
HS-3	580	412	991	31	19	50	5%	5%	5%
HS-1	140	142	282	23	6	30	17%	5%	11%
G-3	110	125	235	15	6	22	14%	5%	9%
G-4	133	150	283	139	135	275	105%	90%	97%
G-5	290	317	607	39	0	39	13%	0%	6%
HS-2	383	158	541	174	170	344	46%	107%	64%
D	383	410	793	1,039	928	1,967	271%	226%	248%
HS-4	186	625	811	60	242	303	32%	39%	37%
ROW Spring 2020*	174	320	494	200	158	358	115%	49%	72%
Bill Walsh*	--	--	--	5	115	120	--	--	--
Total Volume Estimate:	5,410	4,609	10,018	3,108	2,462	5,571	57%	53%	56%
Original 2019 RD Volumes:	5,236	4,289	9,524						

Notes:

-- - No remedial design volume or variance
% - Percentage
CY - Cubic yard
RD - Remedial Design

*ROW Spring 2020 and Bill Walsh excavation areas were not included within the original RD

The total excavation volume for HS-2 and HS-4 (344+303 = 647 CY) was calculated using the 2019 final surveys.

The total excavation volumes for ROW Spring 2020 (358 CY) and Bill Walsh (120 CY) were calculated using the 2020 final surveys.

Total soil volume excavated (5,571 CY), total clean soil volume excavated (3,108 CY), and total contaminated soil volume excavated (2,462 CY) are final surveyed volumes from 2020.

Table 3
Verification Soil Sampling Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Verification Sample Number	Sample Date	Field Laboratory Gamma Spec Result (pCi/g)[1]	Preliminary Off-Site Laboratory Radium-226 Result (pCi/g)[2]	Preliminary Off-Site Laboratory Radium-228 Result (pCi/g)[2]	Final Off-Site Laboratory Radium-226 Result (pCi/g)[2,3]	Final Off-Site Laboratory Radium-228 Result (pCi/g)[2,3]
NPL8FP-VF-A0-03	7/30/2019	2.23	0.91	1.69	1.16	1.66
NPL8FP-VF-A1-03	7/30/2019	2.75	0.68	1.28	0.79	1.48
NPL8FP-VF-B0-04	7/30/2019	2.65	0.92	1.77	0.86	1.44
NPL8FP-VF-B1-03	7/30/2019	2.24	0.71	1.07	0.76	1.27
NPL8FP-VF-B1-03-FD	7/30/2019	2.24	0.64	1.28	0.90	1.15
NPL8FP-VF-B4B5-01[4]	7/30/2019	3.23	1.07	1.37	1.35	1.45
NPL8FP-VF-C1-04	7/30/2019	3.03	0.91	1.43	1.36	1.10
NPL8FP-VF-C2-03	7/31/2019	3.47	1.08	1.23	2.00	1.41
NPL8FP-VF-D1-05	7/30/2019	3.34	0.98	1.51	1.05	1.58
NPL8FP-VF-D2-01	7/30/2019	2.89	0.99	1.35	1.30	1.20
NPL8FP-VF-E2-02	8/2/2019	2.60	0.96	1.21	1.41	1.05
NPL8FP-VF-E3-03	8/2/2019	2.51	1.02	1.44	1.05	1.48
NPL8FP-VF-F3-05	8/2/2019	2.81	1.14	1.66	1.20	1.15
NPL8FP-VF-G4-02	8/2/2019	3.81	1.72	1.61	1.88	1.68
NPL8FP-VF-H4-02	8/2/2019	2.95	1.03	1.47	1.23	1.59
NPL8FP-VF-H4-02-FD	8/2/2019	2.95	1.34	1.56	1.52	1.81
NPL8FP-VF-I4-02	8/2/2019	3.60	1.00	1.37	1.23	1.42
NPL8FP-VF-R6-02	8/7/2019	2.23	0.65	0.92	0.66	0.67
NPL8FP-VF-S6-02	8/7/2019	2.62	0.61	1.03	0.81	0.81
NPL8FP-VF-J3-05	8/17/2019	3.05	1.02	0.98	1.58	1.00
NPL8FP-VF-J4-02	8/17/2019	3.17	0.70	1.28	0.87	1.24
NPL8FP-VF-K3-02	8/17/2019	3.64	1.16	1.46	1.45	1.84
NPL8FP-VF-K3-02-FD	8/17/2019	3.64	1.07	1.44	1.21	1.35
NPL8FP-VF-K4-02	8/17/2019	2.35	0.84	0.93	1.30	0.90
NPL8FP-VF-K6-03	8/17/2019	3.08	0.84	1.13	1.45	1.05
NPL8FP-VF-L3-02	8/17/2019	3.62	1.22	1.50	1.64	1.22
NPL8FP-VF-L4-03[5]	8/17/2019	4.02	1.30	1.11	1.92	1.19
NPL8FP-VF-L6-04	8/17/2019	3.63	1.78	1.49	2.17	1.30
NPL8FP-VF-L7-04	8/17/2019	3.99	0.89	1.42	0.77	1.46
NPL8FP-VF-M6-04	8/17/2019	3.58	0.99	1.21	1.33	1.07
NPL8FP-VF-M7-1.5	8/17/2019	3.23	1.30	0.86	1.80	0.61
NPL8FP-VF-E4-02	8/29/2019	3.06	1.00	1.29	1.20	1.48
NPL8FP-VF-F4-02	8/29/2019	3.83	1.11	1.65	1.09	1.51
NPL8FP-VF-F4-02-FD	8/29/2019	3.83	1.15	1.15	1.21	1.29
NPL8FP-VF-F5-1.5	8/29/2019	3.01	0.78	1.35	1.03	1.53

Table 3
Verification Soil Sampling Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Verification Sample Number	Sample Date	Field Laboratory Gamma Spec Result (pCi/g)[1]	Preliminary Off-Site Laboratory Radium-226 Result (pCi/g)[2]	Preliminary Off-Site Laboratory Radium-228 Result (pCi/g)[2]	Final Off-Site Laboratory Radium-226 Result (pCi/g)[2,3]	Final Off-Site Laboratory Radium-228 Result (pCi/g)[2,3]
NPL8FP-VF-G5-03	8/29/2019	3.21	1.29	1.67	1.51	1.44
NPL8FP-VF-H5-02	8/29/2019	2.73	0.96	1.40	1.25	1.32
NPL8FP-VF-I5-02	8/29/2019	2.96	0.73	1.13	1.10	1.12
NPL8FP-VF-J5-1.5	8/29/2019	2.97	1.09	1.00	1.06	0.99
NPL8FP-VF-S3-12	10/16/2019	3.11	1.11	1.40	1.01	1.59
NPL8FP-VF-S4-12	10/16/2019	3.43	1.17	1.77	1.21	1.39
NPL8FP-VF-T3T4-12[4]	10/16/2019	3.52	0.84	1.43	1.00	1.45
NPL8FP-VF-H6-02	10/17/2019	2.59	1.01	1.13	1.17	1.79
NPL8FP-VF-H6-02-FD	10/17/2019	2.59	0.90	1.40	1.02	1.15
NPL8FP-VF-I6-02	10/17/2019	3.69	1.37	1.41	1.74	1.26
NPL8FP-VF-P3P4-13[4]	10/22/2019	2.57	0.67	1.34	0.99	1.37
NPL8FP-VF-Q3-13	10/22/2019	1.99	0.64	1.57	0.88	1.38
NPL8FP-VF-Q4-13	10/22/2019	2.58	0.91	1.40	0.97	1.54
NPL8FP-VF-R3-13	10/22/2019	2.44	0.85	1.53	0.95	1.40
NPL8FP-VF-R4-13	10/22/2019	3.51	1.10	1.42	0.87	1.37
NPL8FP-VF-E7-04[5]	11/14/2019	2.71	0.99	1.39	1.15	1.18
NPL8FP-VF-F7-05	11/14/2019	2.38	1.03	1.26	1.24	1.19
NPL8FP-VF-G7-04	11/14/2019	2.63	0.62	1.56	0.90	1.42
NPL8FP-VF-H7-03	11/14/2019	4.07	1.36	1.16	2.30	1.38
NPL8FP-VF-H8-01	11/14/2019	1.43	0.49	0.62	0.76	0.24
NPL8FP-VF-I7-04	11/14/2019	3.73	1.41	1.23	1.96	1.06
NPL8FP-VF-I8-03	11/14/2019	2.05	0.53	1.12	1.13	1.08
NPL8FP-VF-J6-02	11/14/2019	3.31	1.44	1.32	1.74	1.80
NPL8FP-VF-J7-05	11/14/2019	3.12	1.15	1.74	1.56	1.55
NPL8FP-VF-J7-05-FD	11/14/2019	3.12	1.17	1.48	1.41	1.50
NPL8FP-VF-J8-06	11/14/2019	3.28	1.08	1.13	1.27	1.09
NPL8FP-VF-K5-02	11/14/2019	2.36	0.79	1.04	0.92	1.43
NPL8FP-VF-K7-05	11/14/2019	3.32	1.35	1.53	1.30	1.30
NPL8FP-VF-K8-06	11/14/2019	3.38	1.18	1.52	1.37	1.27
NPL8FP-VF-L4-03[5]	11/18/2019	2.95	1.14	1.53	1.06	1.33
NPL8FP-VF-L4-03-FD[5]	11/18/2019	2.95	0.90	0.92	1.24	1.19
NPL8FP-VF-L5-04	11/18/2019	3.31	1.28	1.13	1.39	1.33
NPL8FP-VF-L8-08	11/14/2019	5.12	2.40	1.92	3.03	1.35
NPL8FP-VF-M5-04	11/18/2019	3.56	1.43	1.17	2.00	0.93

Table 3
Verification Soil Sampling Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Verification Sample Number	Sample Date	Field Laboratory Gamma Spec Result (pCi/g)[1]	Preliminary Off-Site Laboratory Radium-226 Result (pCi/g)[2]	Preliminary Off-Site Laboratory Radium-228 Result (pCi/g)[2]	Final Off-Site Laboratory Radium-226 Result (pCi/g)[2,3]	Final Off-Site Laboratory Radium-228 Result (pCi/g)[2,3]
NPL8FP-VF-A'6-03	5/21/2020	4.31	1.79	0.97	2.48	1.22
NPL8FP-VF-A6-04	5/21/2020	4.01	1.42	1.37	1.42	1.33
NPL8FP-VF-B6-04	5/26/2020	3.37	1.09	1.41	1.30	1.36
NPL8FP-VF-B6-04-FD	5/26/2020	3.37	1.15	1.55	1.42	1.32
NPL8FP-VF-B7-03	5/22/2020	3.82	1.41	1.04	1.88	0.80
NPL8FP-VF-C6-04	5/22/2020	3.44	1.38	1.31	1.83	1.24
NPL8FP-VF-C7-04	5/22/2020	3.15	1.11	1.13	1.58	0.95
NPL8FP-VF-D6D7-04[6]	5/11/2020	3.90	1.55	1.46	1.98	1.11
NPL8FP-VF-E7-05[5]	5/11/2020	3.18	1.22	1.28	1.48	1.28
NPL8-VF-B'5-04	6/18/2020	3.24	0.80	1.46	1.46	1.28
NPL8-VF-B'6-04	6/18/2020	3.97	1.07	1.54	1.75	1.50
NPL8-VF-B'6-04-FD	6/18/2020	3.57	1.07	1.30	1.41	1.60
NPL8-VF-C'5-06	6/18/2020	3.98	0.78	1.13	1.45	1.41
NPL8-VF-C'6-06	6/18/2020	3.57	0.84	1.41	1.16	1.39

Notes:

	Samples were collected from native clay on excavation floor.
FD	Field Duplicate
Gamma Spec	Gamma spectroscopy
NPL8FP	NPL-8 Frontage Property
pCi/g	Picocuries per gram
VF	Verification sample

1 - On-site field laboratory analytical results include radium-226 plus radium-228.

2 - Preliminary off-site laboratory analytical results for radium-226 and -228 were reported within 7 days. Final results were reported within 28 days to allow for a 21-day ingrowth period.

3 - Final off-site laboratory radium-226 result was compared to the remedial action objective of 6.2 pCi/g radium-226 to determine if the remedial objective was met in each grid.

4 - Samples were collected from combined grids when the total excavated area was less than 100 square meters.

5 - Grid was resampled because of additional removal work leading to the expansion of a previously verified excavation area.

6 - Sample NPL8FP-VF-D6D7-04 was collected as a combined grid from D6 and D7 because the excavation area only included an approximately three square foot portion of grid D6.

Table 4
Backfill Quantities
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Project Phase	CA1 (Tons)	City of Ottawa Clay Backfill (Cubic Yards)	Clean Overburden (Cubic Yards)	Drying Agent[a] (Ton)
Remedial Design (RD) Estimate	2,632	3,899	5,236	100
RA Total Backfill	**369.32**	**1,543**	**3,108**	**348.81**
Change from RD to RA	-2,262.68	-2,356	-2,128	248.81

Notes:

[a] - A total of 10 tons of Calciment and 338.81 tons of bulk lime were used as drying agents.

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
7/17/2019	Background	1.05E-12	3.72E-16
7/19/2019	East	2.31E-14	0.00E+00
	South-1	3.38E-14	1.92E-15
	South-2	2.14E-14	0.00E+00
	West	1.25E-14	0.00E+00
7/22/2019	East	7.17E-14	7.93E-15
	South-1	1.04E-13	0.00E+00
	South-2	5.35E-14	0.00E+00
	West	9.58E-14	0.00E+00
7/23/2019	East	4.93E-13	0.00E+00
	South-1	4.86E-13	0.00E+00
	South-2	3.65E-13	0.00E+00
	West	6.12E-13	0.00E+00
7/24/2019	East	1.28E-12	0.00E+00
	South-1	1.67E-12	0.00E+00
	South-2	1.39E-12	0.00E+00
	West	1.03E-12	0.00E+00
7/25/2019	East	1.01E-12	0.00E+00
	South-1	7.95E-13	0.00E+00
	South-2	6.14E-13	0.00E+00
	West	8.58E-13	3.16E-15
7/26/2019	East	4.72E-14	0.00E+00
	South-1	8.36E-14	1.47E-15
	South-2	2.03E-14	3.29E-15
	West	6.09E-14	1.04E-15
7/29/2019	East	8.34E-13	2.92E-15
	South-1	8.85E-13	4.78E-15
	South-2	7.32E-13	0.00E+00
	West	6.14E-13	0.00E+00
7/30/2019	East	5.13E-13	1.95E-15
	South-1	4.87E-13	8.70E-15
	South-2	5.39E-13	0.00E+00
	West	5.36E-13	1.29E-14
7/31/2019	East	6.22E-13	2.91E-14
	South-1	5.29E-13	1.59E-15
	South-2	4.10E-13	0.00E+00
	West	4.22E-13	0.00E+00
8/1/2019	East	8.51E-13	1.14E-14
	South-1	8.48E-13	1.31E-15
	South-2	3.58E-13	4.18E-15
	West	8.35E-13	7.02E-15
8/2/2019	East	1.97E-14	0.00E+00
	South-1	2.27E-14	0.00E+00
	South-2	1.91E-15	0.00E+00
	West	1.52E-14	0.00E+00
8/5/2019	East	1.20E-12	3.90E-14
	South-1	1.23E-12	0.00E+00
	South-2	8.70E-13	3.48E-16
	West	5.59E-13	0.00E+00

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
8/6/2019	East	1.93E-13	0.00E+00
	South-1	1.55E-13	0.00E+00
	South-2	1.19E-13	2.18E-14
	West	2.82E-13	3.03E-15
8/7/2019	East	5.72E-13	3.29E-15
	South-1	7.35E-13	0.00E+00
	South-2	4.82E-13	0.00E+00
	West	8.29E-13	0.00E+00
8/8/2019	East	6.67E-13	5.87E-15
	South-1	8.27E-13	1.32E-14
	South-2	5.54E-13	0.00E+00
	West	7.55E-13	5.23E-15
8/9/2019	East	3.86E-14	0.00E+00
	South-1	2.16E-14	0.00E+00
	South-2	1.77E-14	0.00E+00
	West	3.14E-14	0.00E+00
8/12/2019	East	1.37E-12	2.32E-14
	South-1	1.62E-12	2.28E-14
	South-2	1.40E-12	4.85E-14
	West	1.47E-12	2.22E-14
8/13/2019	East	3.73E-13	1.13E-14
	South-1	2.50E-13	0.00E+00
	South-2	3.28E-13	0.00E+00
	West	2.52E-13	0.00E+00
8/14/2019	East	5.17E-13	0.00E+00
	South-1	5.09E-13	0.00E+00
	South-2	3.69E-13	0.00E+00
	West	5.64E-13	0.00E+00
8/15/2019	East	2.96E-13	0.00E+00
	South-1	2.29E-13	0.00E+00
	South-2	2.03E-13	0.00E+00
	West	3.89E-13	0.00E+00
8/16/2019	East	1.77E-14	0.00E+00
	South-1	4.59E-14	5.41E-15
	South-2	1.27E-14	6.99E-16
	West	1.50E-14	0.00E+00
8/19/2019	East	6.81E-13	4.01E-15
	South-1	7.76E-13	2.20E-15
	South-2	4.80E-13	9.67E-15
	West	8.28E-13	0.00E+00
8/20/2019	East	2.95E-12	0.00E+00
	South-1	2.65E-12	1.61E-14
	South-2	1.89E-12	0.00E+00
	West	3.96E-12	0.00E+00
8/21/2019	East	7.19E-13	0.00E+00
	South-1	5.56E-13	5.11E-15
	South-2	4.84E-13	5.23E-15
	West	7.45E-13	1.56E-15

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
8/22/2019	East	2.62E-13	3.76E-15
	South-1	1.64E-13	1.27E-15
	South-2	2.53E-13	0.00E+00
	West	2.65E-13	3.21E-15
8/23/2019	East	1.01E-14	0.00E+00
	South-1	5.55E-15	4.48E-15
	South-2	1.07E-14	0.00E+00
	West	6.77E-15	0.00E+00
8/27/2021	East	4.04E-13	0.00E+00
	South-1	3.58E-13	0.00E+00
	South-2	2.09E-13	3.56E-16
	West	2.28E-13	0.00E+00
8/28/2019	East	2.43E-13	0.00E+00
	South-1	3.77E-13	5.06E-16
	South-2	2.37E-13	0.00E+00
	West	2.53E-13	0.00E+00
8/29/2019	East	7.60E-13	0.00E+00
	South-1	5.48E-13	0.00E+00
	South-2	6.22E-13	0.00E+00
	West	6.08E-13	0.00E+00
8/30/2019	East	1.79E-14	3.38E-15
	South-1	1.02E-14	1.03E-14
	South-2	0.00E+00	1.50E-14
	West	0.00E+00	7.71E-16
9/4/2019	East	Malfunctioning unit	Malfunctioning unit
	South-1	1.38E-13	0.00E+00
	South-2	7.78E-14	0.00E+00
	West	1.39E-13	0.00E+00
9/5/2019	East	2.84E-13	0.00E+00
	South-1	3.36E-13	6.15E-15
	South-2	2.48E-13	0.00E+00
	West	2.08E-13	0.00E+00
9/6/2019	East	9.60E-15	0.00E+00
	South-1	0.00E+00	0.00E+00
	South-2	7.82E-15	0.00E+00
	West	1.28E-14	0.00E+00
9/9/2019	East	5.87E-13	0.00E+00
	South-1	5.91E-13	1.49E-15
	South-2	4.69E-13	9.05E-15
	West	4.64E-13	6.89E-15
9/10/2019	East	3.89E-13	0.00E+00
	South-1	6.37E-13	0.00E+00
	South-2	5.02E-13	0.00E+00
	West	7.25E-13	0.00E+00
9/11/2019	East	1.21E-12	0.00E+00
	South-1	1.40E-12	0.00E+00
	South-2	7.39E-13	0.00E+00
	West	1.13E-12	0.00E+00

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
9/12/2019	East	5.95E-13	0.00E+00
	South-1	9.91E-13	0.00E+00
	South-2	7.23E-13	0.00E+00
	West	1.10E-12	0.00E+00
9/13/2019	East	0.00E+00	0.00E+00
	South-1	0.00E+00	0.00E+00
	South-2	0.00E+00	0.00E+00
	West	0.00E+00	0.00E+00
9/16/2019	East	1.02E-13	6.45E-15
	South-1	1.11E-13	0.00E+00
	South-2	2.09E-13	0.00E+00
	West	3.11E-13	0.00E+00
9/17/2019	East	2.52E-13	0.00E+00
	South-1	1.28E-13	0.00E+00
	South-2	1.25E-13	0.00E+00
	West	1.87E-13	0.00E+00
9/18/2019	No air monitoring - tree cutting only		
9/19/2019	East	6.54E-13	2.53E-15
	South-1	6.99E-13	7.33E-15
	South-2	1.13E-12	0.00E+00
	West	7.55E-13	0.00E+00
9/20/2019	East	8.92E-15	4.92E-16
	South-1	8.62E-15	1.47E-14
	South-2	0.00E+00	9.07E-15
	West	4.23E-15	3.56E-15
9/23/2019	East	3.92E-14	0.00E+00
	South-1	9.75E-14	0.00E+00
	South-2	4.60E-14	0.00E+00
	West	8.11E-14	0.00E+00
9/24/2019	East	2.27E-13	0.00E+00
	South-1	2.60E-13	0.00E+00
	South-2	3.86E-13	1.09E-15
	West	2.08E-13	4.85E-15
9/25/2019	East	0.00E+00	0.00E+00
	South-1	1.39E-13	0.00E+00
	South-2	2.52E-13	0.00E+00
	West	1.90E-13	0.00E+00
9/26/2019	East	1.56E-13	1.28E-14
	South-1	1.16E-13	4.60E-16
	South-2	1.57E-13	5.29E-15
	West	2.36E-13	4.11E-16
9/27/2019	East	1.95E-14	0.00E+00
	South-1	0.00E+00	0.00E+00
	South-2	1.95E-14	0.00E+00
	West	2.27E-14	0.00E+00
9/30/2019	East	6.20E-14	0.00E+00
	South-1	1.59E-13	0.00E+00
	South-2	2.97E-13	2.28E-14
	West	2.42E-13	0.00E+00

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
10/1/2019	East	1.72E-13	0.00E+00
	South-1	2.75E-13	3.28E-15
	South-2	2.30E-13	9.15E-15
	West	1.64E-13	0.00E+00
10/2/2019	East	9.21E-14	0.00E+00
	South-1	7.00E-14	5.14E-16
	South-2	6.80E-14	0.00E+00
	West	9.60E-14	0.00E+00
10/3/2019	East	2.08E-14	0.00E+00
	South-1	3.13E-14	0.00E+00
	South-2	1.53E-14	0.00E+00
	West	4.28E-14	0.00E+00
10/4/2019	East	1.51E-15	7.05E-15
	South-1	0.00E+00	9.86E-15
	South-2	0.00E+00	1.39E-14
	West	0.00E+00	0.00E+00
10/7/2019	East	5.43E-14	0.00E+00
	South-1	1.07E-13	1.07E-14
	South-2	8.43E-14	0.00E+00
	West	2.08E-13	0.00E+00
10/8/2019	East	1.62E-13	8.38E-15
	South-1	2.94E-13	0.00E+00
	South-2	2.03E-13	1.14E-14
	West	2.81E-13	0.00E+00
10/9/2019	No excavation activities - only one monitor used		
	West	5.30E-13	0.00E+00
10/10/2019	East	1.60E-12	0.00E+00
	South-1	1.09E-12	0.00E+00
	South-2	9.53E-13	0.00E+00
	West	9.86E-13	5.38E-15
10/14/2019	East	1.15E-13	3.31E-15
	South-1	1.64E-13	0.00E+00
	South-2	1.02E-13	0.00E+00
	West	3.86E-15	0.00E+00
10/15/2019	East	2.55E-13	0.00E+00
	South-1	2.54E-13	0.00E+00
	South-2	5.21E-13	1.39E-14
	West	5.62E-13	0.00E+00
10/16/2019	East	6.41E-14	5.66E-16
	South-1	9.13E-14	4.47E-15
	South-2	6.44E-14	5.51E-15
	West	6.50E-14	5.27E-16
10/17/2019	East	3.32E-13	1.01E-15
	South-1	2.63E-13	5.90E-15
	South-2	3.22E-13	9.84E-15
	West	3.51E-13	1.32E-14

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
10/18/2019	East	7.51E-15	2.74E-14
	South-1	1.14E-14	1.17E-14
	South-2	1.78E-14	1.52E-14
	West	1.90E-14	4.58E-15
10/21/2019	No activities conducted due to rain		
10/22/2019	East	1.23E-13	4.88E-16
	South-1	1.53E-13	0.00E+00
	South-2	1.24E-13	1.19E-14
	West	1.01E-13	0.00E+00
10/23/2019	East	3.61E-13	0.00E+00
	South-1	No power at station - sample not collected	
	South-2	7.30E-13	0.00E+00
	West	4.01E-13	0.00E+00
10/24/2019	East	1.85E-13	3.89E-15
	South-1	2.70E-13	3.71E-15
	South-2	2.22E-13	0.00E+00
	West	3.05E-13	0.00E+00
10/25/2019	East	0.00E+00	2.76E-15
	South-1	0.00E+00	0.00E+00
	South-2	6.13E-15	1.53E-14
	West	0.00E+00	0.00E+00
10/28/2019	East	2.93E-13	6.24E-15
	South-1	1.32E-13	0.00E+00
	South-2	2.10E-13	0.00E+00
	West	2.05E-13	0.00E+00
10/29/2019	East	7.79E-14	0.00E+00
	South-1	7.32E-14	0.00E+00
	South-2	3.13E-14	0.00E+00
	West	6.75E-14	2.17E-15
10/30/2019	No samples collected due to snow		
10/31/2019	No samples collected due to snow		
11/1/2019	East	0.00E+00	1.63E-15
	South-1	0.00E+00	0.00E+00
	South-2	0.00E+00	0.00E+00
	West	0.00E+00	0.00E+00
11/4/2019	East	7.98E-14	4.14E-15
	South-1	1.43E-13	0.00E+00
	South-2	2.46E-13	0.00E+00
	West	1.05E-13	0.00E+00

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
11/5/2019	East	2.81E-13	1.44E-15
	South-1	3.32E-13	0.00E+00
	South-2	2.58E-13	0.00E+00
	West	2.51E-13	0.00E+00
11/6/2019	East	4.47E-13	0.00E+00
	South-1	3.58E-13	0.00E+00
	South-2	2.91E-13	0.00E+00
	West	2.01E-13	0.00E+00
11/7/2019	East	6.36E-14	0.00E+00
	South-1	1.18E-13	0.00E+00
	South-2	6.56E-14	0.00E+00
	West	2.88E-14	0.00E+00
11/8/2019	East	3.72E-15	0.00E+00
	South-1	0.00E+00	1.34E-14
	South-2	0.00E+00	0.00E+00
	West	6.44E-15	0.00E+00
11/9/2019	East	1.04E-13	3.87E-15
	South-1	7.75E-14	0.00E+00
	South-2	5.31E-14	8.04E-15
	West	9.18E-14	3.75E-15
11/11/2019	No samples collected due to snow		
11/12/2019	East	9.24E-14	1.03E-14
	South-1	6.45E-14	1.10E-14
	South-2	1.23E-13	2.51E-14
	West	7.21E-14	0.00E+00
11/13/2019	East	2.53E-13	0.00E+00
	South-1	3.27E-13	2.09E-15
	South-2	1.68E-13	0.00E+00
	West	3.40E-13	6.49E-15
11/14/2019	One sampler functioning due to remaining power diverted for verification sampling purposes		
	West	3.77E-13	1.25E-14
11/15/2019	East	2.27E-14	0.00E+00
	South-1	2.09E-14	0.00E+00
	South-2	3.70E-14	0.00E+00
	West	2.63E-14	0.00E+00
11/18/2019	East	3.56E-13	0.00E+00
	South-1	1.88E-13	0.00E+00
	South-2	4.50E-13	0.00E+00
	West	3.61E-13	0.00E+00
11/19/2019	No samples collected due to rain		

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
11/20/2019	East	6.01E-14	0.00E+00
	South-1	4.81E-14	0.00E+00
	South-2	6.38E-14	0.00E+00
	West	9.23E-14	0.00E+00
11/21/2019	No samples collected due to rain		
11/22/2019	East	1.16E-13	0.00E+00
	South-1	8.65E-14	0.00E+00
	South-2	1.03E-13	0.00E+00
	West	1.73E-13	0.00E+00
11/23/2019	East	8.79E-14	0.00E+00
	South-1	7.57E-14	0.00E+00
	South-2	4.43E-14	0.00E+00
	West	5.18E-14	0.00E+00
11/25/2019	East	8.06E-13	0.00E+00
	South-1	9.06E-13	0.00E+00
	South-2	8.20E-13	2.23E-15
	West	5.77E-13	0.00E+00
11/26/2019	East	No 24-hour analysis due to Thanksgiving holiday	0.00E+00
	South-1		0.00E+00
	South-2		4.22E-15
	West		1.22E-14
11/27/2019	No samples collected due to rain		
11/28/2019	No samples collected due to Thanksgiving holiday		
11/29/2019	No samples collected due to Thanksgiving holiday		
12/2/2019	East	5.66E-14	1.17E-14
	South-1	8.74E-14	2.08E-15
	South-2	1.06E-13	4.20E-15
	West	5.42E-14	4.16E-15
12/3/2019	East	3.68E-15	0.00E+00
	South-1	1.66E-14	0.00E+00
	South-2	1.86E-14	5.97E-15
	West	No West sample collected	
12/4/2019	East	3.96E-13	1.44E-15
	South-1	2.15E-13	1.15E-15
	South-2	2.89E-13	0.00E+00
	West	3.18E-13	0.00E+00

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
12/5/2019	East	4.67E-13	0.00E+00
	South-1	4.48E-13	0.00E+00
	South-2	5.77E-13	3.74E-15
	West	6.07E-13	0.00E+00
12/6/2019	East	1.79E-13	0.00E+00
	South-1	1.38E-13	0.00E+00
	South-2	1.24E-13	0.00E+00
	West	1.44E-13	0.00E+00
12/7/2019	East	8.87E-14	0.00E+00
	South-1	5.52E-14	0.00E+00
	South-2	1.34E-13	0.00E+00
	West	4.86E-14	0.00E+00
12/9/2019	East	3.83E-13	0.00E+00
	South-1	7.01E-13	3.46E-15
	South-2	1.62E-13	0.00E+00
	West	1.98E-13	0.00E+00
12/10/2019	East	3.17E-13	0.00E+00
	South-1	2.90E-13	0.00E+00
	South-2	1.68E-13	0.00E+00
	West	1.52E-13	0.00E+00
12/11/2019	No samples collected due to snow		
12/12/2019	East	4.16E-13	3.19E-15
	South-1	8.53E-13	0.00E+00
	South-2	5.84E-13	0.00E+00
	West	4.85E-13	0.00E+00
12/13/2019	East	3.08E-14	0.00E+00
	South-1	4.48E-14	0.00E+00
	South-2	4.91E-14	0.00E+00
	West	2.03E-14	0.00E+00
12/16/2019	East	9.02E-13	0.00E+00
	South-1	6.79E-13	0.00E+00
	South-2	8.27E-13	0.00E+00
	West	6.04E-13	0.00E+00
5/1/2020	East	6.02E-14	0.00E+00
	South-1	1.41E-14	0.00E+00
	South-2	1.13E-14	0.00E+00
	West	0.00E+00	0.00E+00
5/4/2020	East	1.67E-13	1.17E-14
	South-1	1.69E-13	0.00E+00
	South-2	1.18E-13	1.07E-14
	West	1.38E-13	0.00E+00
5/5/2020	No samples collected due to rain		

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
5/6/2020	East	1.42E-13	9.16E-15
	South-1	8.93E-14	1.82E-15
	South-2	1.04E-13	8.17E-15
	West	1.12E-13	3.29E-15
5/7/2020	East	4.07E-13	6.46E-16
	South-1	3.02E-13	0.00E+00
	South-2	5.29E-13	0.00E+00
	West	2.24E-13	7.82E-16
5/8/2020	East	0.00E+00	0.00E+00
	South-1	0.00E+00	0.00E+00
	South-2	0.00E+00	0.00E+00
	West	4.27E-15	4.77E-16
5/11/2020	East	4.69E-13	0.00E+00
	South-1	4.39E-13	0.00E+00
	South-2	3.00E-13	0.00E+00
	West	5.47E-13	0.00E+00
5/12/2020	East	7.85E-13	3.65E-16
	South-1	3.15E-13	0.00E+00
	South-2	4.30E-13	0.00E+00
	West	5.51E-13	0.00E+00
5/13/2020	East	3.71E-13	0.00E+00
	South-1	6.07E-13	0.00E+00
	South-2	4.02E-13	0.00E+00
	West	2.99E-13	0.00E+00
5/14/2020	No samples collected due to rain		
5/15/2020	No samples collected due to rain		
5/18/2020	No samples collected due to rain		
5/19/2020	East	5.43E-15	4.92E-15
	South-1	5.48E-14	9.24E-15
	South-2	1.20E-13	6.39E-15
	West	8.13E-14	0.00E+00
5/20/2020	East	6.10E-14	3.37E-16
	South-1	4.33E-14	3.56E-16
	South-2	No sample collected due to equipment failure	
	West	3.89E-14	4.77E-15
5/21/2020	East	6.72E-14	5.21E-15
	South-1	3.66E-14	6.34E-15
	South-2	4.63E-14	1.79E-14
	West	1.07E-14	1.36E-14

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
5/22/2020	No samples collected due to rain		
5/26/2020	East	3.72E-13	0.00E+00
	South-1	2.96E-13	0.00E+00
	South-2	3.40E-13	4.89E-15
	West	1.66E-13	0.00E+00
5/27/2020	East	6.59E-14	0.00E+00
	South-1	2.40E-14	0.00E+00
	South-2	4.94E-14	0.00E+00
	West	7.04E-14	0.00E+00
5/28/2020	No samples collected due to rain		
5/29/2020	East	1.25E-15	2.86E-15
	South-1	1.87E-14	0.00E+00
	South-2	4.74E-15	0.00E+00
	West	9.14E-15	0.00E+00
6/1/2020	East	1.01E-12	1.48E-14
	South-1	5.74E-13	3.03E-14
	South-2	5.25E-13	1.19E-14
	West	5.97E-13	6.09E-16
6/2/2020	East	4.39E-13	0.00E+00
	South-1	No sample collected due to equipment damage	
	South-2	1.60E-13	0.00E+00
	West	4.53E-13	0.00E+00
6/3/2020	No samples collected due to rain		
6/4/2020	East	4.28E-13	0.00E+00
	South-1	No sample collected due to equipment failure	
	South-2	No sample collected due to brush failure - repaired	
	West	1.02E-13	0.00E+00
6/5/2020	No samples collected due to no excavation work; decontamination and grading activities only		
6/8/2020	East	4.46E-13	1.50E-14
	South-1	3.52E-13	9.56E-15
	South-2	4.34E-13	0.00E+00
	West	4.50E-13	9.03E-16
6/9/2020	East	5.41E-13	0.00E+00
	South-1	4.05E-13	0.00E+00
	South-2	5.16E-13	0.00E+00
	West	4.86E-13	5.13E-15

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
6/10/2020	East	2.37E-13	5.25E-15
	South-1	2.17E-13	0.00E+00
	South-2	2.59E-13	0.00E+00
	West	1.93E-13	0.00E+00
6/11/2020	No samples collected due to no excavation work; clean backfilling of right-of-way activities only		
6/12/2020	East	2.26E-15	0.00E+00
	South-1	0.00E+00	0.00E+00
	South-2	0.00E+00	0.00E+00
	West	0.00E+00	0.00E+00
6/15/2020	East	2.89E-13	1.71E-14
	South-1	2.87E-13	0.00E+00
	South-2	2.46E-13	0.00E+00
	West	3.61E-13	9.03E-15
6/16/2020	East	8.13E-13	0.00E+00
	South-1	5.97E-13	0.00E+00
	South-2	4.68E-13	0.00E+00
	West	6.65E-13	0.00E+00
6/17/2020	East	8.70E-13	4.60E-16
	South-1	9.49E-13	6.10E-15
	South-2	8.13E-13	0.00E+00
	West	1.03E-12	2.86E-15
6/18/2020	East	1.33E-12	0.00E+00
	South-1	1.43E-12	1.50E-14
	South-2	1.16E-12	0.00E+00
	West	1.15E-12	5.83E-15
6/19/2020	East	9.14E-15	0.00E+00
	South-1	0.00E+00	0.00E+00
	South-2	2.00E-14	0.00E+00
	West	1.39E-14	0.00E+00
7/20/2020	South-1	7.24E-14	3.04E-14
	West	7.33E-14	1.15E-15
7/21/2020	South-1	2.69E-13	1.14E-14
	West	1.54E-13	0.00E+00
7/22/2020	South-1	8.34E-14	1.75E-15
	West	8.67E-14	6.91E-15
7/23/2020	South-1	1.41E-13	7.17E-15
	West	3.21E-13	0.00E+00
7/24/2020	South-1	1.46E-13	0.00E+00
	West	2.44E-13	0.00E+00
7/25/2020	No samples collected - liner crew work		
7/27/2020	South-1	3.18E-14	1.20E-14
	West	3.23E-14	0.00E+00
7/28/2020	South-1	1.51E-13	0.00E+00
	West	1.97E-13	4.39E-15

Table 5
Perimeter Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Sample Location	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
7/29/2020	South-1	2.98E-13	6.03E-15
	West	4.08E-13	0.00E+00
7/30/2020	South-1	3.82E-13	7.07E-15
	West	4.09E-13	4.48E-16
7/31/2020	South-1	2.43E-13	0.00E+00
	West	3.41E-13	3.86E-15
8/1/2020	South-1	4.90E-14	0.00E+00
	West	1.57E-13	1.58E-14
8/3/2020	South-1	4.13E-13	0.00E+00
	West	6.57E-13	0.00E+00
8/4/2020	South-1	1.44E-13	0.00E+00
	West	2.19E-13	0.00E+00

Note:
µCi/mL = MicroCurie per milliliter

Table 6
Personal Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Employee Initial	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
7/19/2019	BS	1.36E-14	4.99E-13
	LM	1.75E-13	1.06E-13
7/22/2019	LM	2.29E-13	0.00E+00
	BS	3.40E-13	0.00E+00
7/23/2019	BS	1.47E-12	0.00E+00
	LM	6.23E-13	0.00E+00
7/24/2019	BS	1.16E-12	0.00E+00
	CMS	8.79E-13	0.00E+00
7/25/2019	LM	1.21E-12	0.00E+00
	GH	8.22E-13	0.00E+00
7/26/2019	BS	0.00E+00	0.00E+00
	KK	0.00E+00	0.00E+00
7/29/2019	KK	7.29E-13	3.75E-14
	LM	9.21E-13	0.00E+00
7/30/2019	PP	4.04E-13	0.00E+00
	MT	8.08E-14	0.00E+00
7/31/2019	MT	3.93E-13	1.13E-13
	LM	2.69E-13	0.00E+00
8/1/2019	MT	1.47E-12	3.71E-13
	GH	7.82E-13	0.00E+00
8/2/2019	BS	1.09E-13	0.00E+00
	KK	0.00E+00	0.00E+00
8/5/2019	GH	1.47E-12	1.18E-13
	MT	1.14E-12	5.47E-14
8/6/2019	MT	0.00E+00	0.00E+00
	KK	3.57E-13	2.30E-13
8/7/2019	BS	0.00E+00	4.42E-13
	MT	8.77E-13	0.00E+00
8/8/2019	KK	8.52E-13	4.42E-14
	C	1.45E-12	0.00E+00
8/9/2019	BS	0.00E+00	0.00E+00
	MT	0.00E+00	0.00E+00
8/12/2019	BS	1.97E-12	2.07E-13
	MT	1.42E-12	0.00E+00
8/13/2019	LM	1.64E-13	0.00E+00
	MT	0.00E+00	0.00E+00
8/14/2019	KK	0.00E+00	0.00E+00
	MT	9.19E-13	0.00E+00
8/15/2019	LM	2.29E-13	6.03E-14
	PP	0.00E+00	0.00E+00
8/16/2019	MT	0.00E+00	0.00E+00
	BS	0.00E+00	0.00E+00
8/19/2019	LM	1.23E-12	0.00E+00
	MT	6.02E-13	0.00E+00
8/20/2019	MT	3.54E-12	0.00E+00
	LM	2.46E-12	0.00E+00
8/21/2019	MT	4.63E-13	0.00E+00
	LM	6.28E-13	0.00E+00
8/22/2019	GH	3.48E-13	1.47E-13
	A	5.10E-13	0.00E+00
8/23/2019	MT	2.97E-13	2.33E-14
	A	1.09E-13	0.00E+00
8/26/2019	No samples collected due to rain		

Table 6
Personal Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Employee Initial	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
8/27/2019	RH	5.64E-13	1.12E-13
	LM	3.77E-13	0.00E+00
8/28/2019	KK	1.03E-12	0.00E+00
	RH	7.41E-13	0.00E+00
8/29/2019	RH	1.96E-13	1.65E-13
	BS	5.19E-14	0.00E+00
8/30/2019	RH	2.57E-13	8.35E-14
	KK	0.00E+00	3.79E-13
9/2/2019	No samples collected due to Labor Day holiday		
9/3/2019	T	4.70E-13	0.00E+00
	MT	1.35E-12	4.20E-13
9/4/2019	MT	0.00E+00	0.00E+00
	LM	0.00E+00	1.55E-13
9/5/2019	MT	1.12E-13	0.00E+00
	T	1.76E-13	2.86E-14
9/6/2019	MT	6.09E-14	0.00E+00
	LM	0.00E+00	0.00E+00
9/9/2019	LM	5.13E-13	9.86E-14
	Only 1 personal air monitor used today		
9/10/2019	MT	5.94E-13	0.00E+00
	BS	7.69E-13	2.87E-13
9/11/2019	LM	9.66E-13	1.18E-13
	KK	3.14E-14	2.10E-14
9/12/2019	LM	1.64E-12	0.00E+00
	MT	1.94E-12	1.07E-13
9/13/2019	KK	0.00E+00	2.58E-13
	LM	0.00E+00	1.48E-13
9/16/2019	MT	0.00E+00	0.00E+00
	LM	2.40E-13	0.00E+00
9/17/2019	MT	3.89E-13	0.00E+00
	Sample cartridge lost during collection - no sample analyzed		
9/18/2019	Tree cutting activities only; no excavation work occurred		
9/19/2019	AB	8.34E-13	0.00E+00
	MT	8.64E-13	0.00E+00
9/20/2019	AB	0.00E+00	0.00E+00
	LM	1.94E-14	0.00E+00
9/23/2019	MT	0.00E+00	0.00E+00
	GH	0.00E+00	0.00E+00
9/24/2019	MT	0.00E+00	3.56E-13
	AB	0.00E+00	4.48E-13
9/25/2019	LM	1.03E-12	0.00E+00
	MT	2.83E-13	0.00E+00
9/26/2019	LM	0.00E+00	1.92E-13
	MT	0.00E+00	0.00E+00
9/27/2019	LM	4.12E-13	0.00E+00
	MT	3.28E-13	4.11E-13
9/30/2019	MD	0.00E+00	0.00E+00
	Sample cartridge lost during collection - no sample analyzed		
10/1/2019	AD	4.09E-13	0.00E+00
	MD	4.90E-13	0.00E+00
10/2/2019	MT	3.15E-13	0.00E+00
	AD	1.26E-13	6.37E-14

Table 6
Personal Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Employee Initial	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
10/3/2019	LM	3.24E-13	0.00E+00
	MT	1.67E-13	0.00E+00
10/4/2019	MT	0.00E+00	3.73E-13
	LM	0.00E+00	0.00E+00
10/7/2019	MT	8.72E-14	1.15E-13
	AD	0.00E+00	0.00E+00
10/8/2019	LM	4.35E-13	8.21E-13
	Only 1 personal air monitor used today		
10/9/2019	LM	1.03E-12	3.39E-13
	MT	9.18E-13	0.00E+00
10/10/2019	MT	2.32E-12	0.00E+00
	AD	0.00E+00	0.00E+00
10/11/2019	AD	0.00E+00	0.00E+00
	MT	0.00E+00	0.00E+00
10/14/2019	MT	1.37E-13	0.00E+00
	KK	0.00E+00	0.00E+00
10/15/2019	LM	4.52E-13	2.08E-13
	AA	1.91E-13	1.81E-13
10/16/2019	KK	0.00E+00	1.72E-12
	MT	0.00E+00	2.21E-13
10/17/2019	Sample cartridge lost during collection - no sample analyzed		
	AA	4.32E-13	0.00E+00
10/18/2019	MT	0.00E+00	1.14E-13
	BS	0.00E+00	0.00E+00
10/21/2019	No samples collected due to rain		
10/22/2019	MT	0.00E+00	0.00E+00
	KK	9.02E-14	1.88E-13
10/23/2019	LM	9.59E-13	0.00E+00
	KK	2.82E-13	0.00E+00
10/24/2019	AA	5.48E-14	2.46E-13
	MT	4.81E-14	1.71E-13
10/25/2019	AA	0.00E+00	0.00E+00
	MD	0.00E+00	0.00E+00
10/28/2019	KK	4.24E-13	3.22E-13
	MT	2.74E-13	8.68E-14
10/29/2019	AA	3.28E-13	0.00E+00
	LM	0.00E+00	0.00E+00
10/30/2019	No samples collected due to snow		
10/31/2019	No samples collected due to snow		
11/1/2019	AA	0.00E+00	0.00E+00
	LM	0.00E+00	0.00E+00
11/4/2019	TF	0.00E+00	9.89E-14
	AB	0.00E+00	0.00E+00
11/5/2019	LM	0.00E+00	2.65E-13
	AA	9.29E-14	2.01E-13
11/6/2019	TF	4.65E-13	0.00E+00
	BS	0.00E+00	0.00E+00
11/7/2019	AA	0.00E+00	0.00E+00
	LM	0.00E+00	0.00E+00
11/8/2019	TF	0.00E+00	2.04E-14
	KK	0.00E+00	7.37E-14

Table 6
Personal Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Employee Initial	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
11/11/2019	No samples collected due to rain		
11/12/2019	KK	0.00E+00	2.41E-13
	MT	6.82E-14	1.48E-13
11/13/2019	KK	1.79E-13	3.41E-13
	LM	0.00E+00	3.44E-13
11/14/2019	CM	0.00E+00	4.81E-14
	MT	0.00E+00	0.00E+00
11/15/2019	MT	0.00E+00	0.00E+00
	KK	0.00E+00	0.00E+00
11/18/2019	KK	5.14E-13	0.00E+00
	LM	1.38E-13	0.00E+00
5/1/2020	GH	4.85E-14	0.00E+00
	MT	0.00E+00	4.93E-13
5/4/2020	KK	0.00E+00	2.26E-13
	GH	8.84E-14	5.04E-14
5/5/2020	No samples collected due to rain		
5/6/2020	GH	1.82E-13	2.17E-13
	MT	1.36E-13	2.17E-13
5/7/2020	GH	4.01E-13	0.00E+00
	GM	9.89E-14	0.00E+00
5/8/2020	MT	0.00E+00	0.00E+00
	GH	0.00E+00	0.00E+00
5/11/2020	RH	4.32E-13	0.00E+00
	MT	4.43E-13	0.00E+00
5/12/2020	SS	8.13E-13	0.00E+00
	MT	3.96E-13	0.00E+00
5/13/2020	SS	2.07E-13	0.00E+00
	MT	7.94E-13	0.00E+00
5/14/2020	No samples collected due to rain		
5/15/2020	No samples collected due to rain		
5/18/2020	No samples collected due to rain		
5/19/2020	GH	4.59E-13	5.94E-13
	RH	4.59E-13	2.56E-13
5/20/2020	RH	2.81E-14	2.76E-13
	MT	0.00E+00	2.31E-13
5/21/2020	RH	0.00E+00	3.96E-14
	GH	0.00E+00	1.93E-13
5/22/2020	No samples collected; GPS and verification survey activities only		
5/25/2020	No samples collected due to Labor Day holiday		
5/26/2020	MB	0.00E+00	0.00E+00
	MD	3.08E-13	1.42E-13
5/27/2020	MT	5.06E-13	4.05E-14
	BS	1.49E-13	8.93E-14
5/28/2020	No samples collected due to rain		
5/29/2020	MT	2.94E-13	0.00E+00
	MB	3.97E-14	1.78E-13

Table 6
Personal Air Monitoring Results
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Sample Date	Employee Initial	24-Hour Analysis Radium-226 (µCi/mL)	96-Hour Analysis Radium-226 (µCi/mL)
6/1/2020	JS	1.53E-12	2.02E-13
	MB	2.33E-12	1.76E-14
6/2/2020	JS	3.48E-13	3.02E-14
	MB	1.31E-12	2.52E-13
6/3/2020	BS	6.70E-13	6.01E-13
	MB	3.42E-13	0.00E+00
6/4/2020	JS	2.54E-13	7.62E-14
	MB	5.75E-13	1.66E-13
6/5/2020	No samples collected; decontamination and grading activities only		
6/8/2020	AS	1.76E-13	8.98E-14
	SA	9.88E-13	6.01E-13
6/9/2020	CC	9.95E-13	0.00E+00
	GT	4.55E-13	0.00E+00
6/10/2020	GT	0.00E+00	0.00E+00
	SA	4.17E-13	0.00E+00
6/11/2020	No samples collected; clean backfilling of right-of-way activities only		
6/12/2020	MW	0.00E+00	0.00E+00
	GH	0.00E+00	1.16E-13
6/15/2020	RV	8.88E-13	3.04E-13
	MW	8.49E-13	4.01E-14
6/16/2020	MB	5.49E-13	0.00E+00
	MT	7.76E-13	0.00E+00
6/17/2020	MW	2.25E-15	0.00E+00
	MT	1.21E-15	0.00E+00
6/18/2020	RB	1.84E-12	0.00E+00
	MT	1.66E-12	0.00E+00
6/19/2020	MT	3.13E-13	0.00E+00
	MW	3.11E-13	0.00E+00
7/20/2020	No samples collected; landfill grading activities only		
7/21/2020	MT	5.97E-13	3.84E-13
	GH	0.00E+00	0.00E+00
7/22/2020	MT	0.00E+00	0.00E+00
	GH	5.14E-14	0.00E+00
7/23/2020	MT	0.00E+00	0.00E+00
	GH	2.36E-13	2.39E-14
7/24/2020	MT	2.43E-13	0.00E+00
	KK	7.72E-13	3.15E-14
7/25/2020	No samples collected; liner crew activities only		

Notes:

DAC = Derived air concentration

PAM = Personal air monitor

µCi/mL = MicroCurie per milliliter

Samples with counts greater than background on day after analysis were analyzed again after four days to allow radon / thoron progeny decay.

Occupational Dose Limit for Occupational Radiation Exposure = 5 REM Total Effective Dose Equivalent

2000 DAC Hours = 5 REM

DAC for Ra-226 = 3E-10 µCi/ml

Administrative Site Limit for Occupational Exposure = 10% Ra-226 DAC = 3E-11 µCi/mL

Table 7
Particulate Air Monitoring Data
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Air Monitoring Date	PM4 Instantaneous Maximum (mg/m^3)	Maximum 15 Minute TWA (mg/m^3)	8-hour TWA (mg/m^3)
7/19/2019	0.217	0.055	--
7/22/2019	0.115	0.020	--
7/23/2019	0.376	0.091	--
7/24/2019	0.775	0.105	0.057
7/25/2019	0.312	0.060	--
7/26/2019	0.599	0.118	0.060
7/29/2019	0.847	0.109	--
7/30/2019	0.430	0.079	--
7/31/2019	0.649	0.176	0.027
8/1/2019	0.503	0.117	--
8/2/2019	0.100	0.016	--
8/5/2019	1.210	0.191	0.043
8/6/2019	0.111	0.031	0.016
8/7/2019	0.231	0.039	--
8/8/2019	0.180	0.025	--
8/9/2019	0.528	0.029	--
8/12/2019	0.151	0.072	--
8/13/2019	0.070	0.036	--
8/14/2019	0.042	0.014	--
8/15/2019	0.320	0.027	--
8/16/2019	0.714	0.074	--
8/19/2019	0.031	0.003	--
8/20/2019	0.042	0.031	--
8/21/2019	0.140	0.020	--
8/22/2019	0.157	0.015	--
8/23/2019	0.131	0.037	--
8/27/2019	0.044	0.018	--
8/28/2019	0.057	0.019	--
8/29/2019	0.673	0.035	--
8/30/2019	0.187	0.036	--
9/4/2019	0.021	0.008	--
9/5/2019	0.143	0.057	0.010
9/6/2019	0.094	0.015	0.011
9/9/2019	0.075	0.023	--
9/10/2019	0.070	0.030	--
9/11/2019	0.214	0.037	--
9/12/2019	0.129	0.038	--
9/13/2019	0.042	0.016	--
9/16/2019	0.056	0.028	--
9/17/2019	0.068	0.040	0.018
9/19/2019	0.701	0.051	--
9/20/2019	0.198	0.026	0.012
9/23/2019	0.078	0.007	--
9/24/2019	0.162	0.049	--
9/25/2019	0.203	0.048	--

Table 7
Particulate Air Monitoring Data
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Air Monitoring Date	PM4 Instantaneous Maximum (mg/m^3)	Maximum 15 Minute TWA (mg/m^3)	8-hour TWA (mg/m^3)
9/26/2019	0.196	0.029	0.006
9/27/2019	0.315	0.024	--
9/30/2019	0.084	0.022	0.020
10/1/2019	0.187	0.025	--
10/2/2019	0.262	0.016	--
10/3/2019	0.063	0.003	--
10/4/2019	0.219	0.015	--
10/7/2019	0.172	0.060	--
10/10/2019	0.067	0.016	--
10/14/2019	0.541	0.040	--
10/15/2019	0.147	0.034	--
10/16/2019	0.040	0.009	--
10/17/2019	0.148	0.013	--
10/18/2019	0.175	0.026	--
10/23/2019	0.067	0.015	0.008
10/24/2019	0.069	0.014	0.007
10/25/2019	0.055	0.014	--
10/28/2019	0.046	0.018	--
10/29/2019	0.094	0.028	--
11/1/2019	0.131	0.007	--
11/4/2019	0.062	0.010	--
11/5/2019	0.077	0.018	--
11/6/2019	0.343	0.021	--
11/7/2019	0.038	0.011	0.004
11/8/2019	0.096	0.012	--
11/12/2019	0.024	0.005	--
11/13/2019	0.272	0.117	--
11/14/2019	0.124	0.039	--
11/15/2019	0.122	0.042	--
11/18/2019	0.061	0.044	--
11/19/2019	0.037	0.035	--
11/20/2019	0.029	0.020	--
11/22/2019	0.094	0.011	--
11/25/2019	0.044	0.027	--
11/26/2019	0.094	0.028	--
12/2/2019	0.005	0.004	--
12/3/2019	0.020	0.013	--
12/4/2019	0.011	0.007	--
12/5/2019	0.034	0.018	--
12/6/2019	0.018	0.016	--
12/7/2019	0.046	0.033	--
12/9/2019	0.114	0.058	--
12/10/2019	0.063	0.009	--
12/12/2019	0.035	0.023	--
12/13/2019	0.120	0.023	--

Table 7
Particulate Air Monitoring Data
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Air Monitoring Date	PM4 Instantaneous Maximum (mg/m^3)	Maximum 15 Minute TWA (mg/m^3)	8-hour TWA (mg/m^3)
5/1/2020	0.033	0.012	--
5/4/2020	0.044	0.020	--
5/6/2020	0.034	0.019	0.009
5/7/2020	0.081	0.021	--
5/8/2020	0.048	0.018	--
5/11/2020	0.052	0.026	0.005
5/12/2020	0.014	0.005	0.003
5/13/2020	0.054	0.022	0.012
5/15/2020	0.028	0.011	--
5/19/2020	0.044	0.034	0.019
5/20/2020	0.037	0.018	0.013
5/21/2020	0.076	0.023	0.011
5/26/2020	0.042	0.017	--
5/27/2020	0.095	0.028	--
5/29/2020	0.166	0.018	0.007
6/1/2020	0.042	0.023	--
6/2/2020	0.097	0.022	--
6/4/2020	0.699	0.198	--
6/8/2020	0.026	0.013	--
6/9/2020	0.050	0.018	--
6/10/2020	0.042	0.017	--
6/15/2020	0.655	0.045	--
6/16/2020	0.203	0.045	0.015
6/17/2020	0.254	0.053	0.018
6/18/2020	0.082	0.039	0.016
6/19/2020	0.179	0.037	--
7/20/2020	0.020	0.008	--
7/21/2020	0.060	0.013	--
7/22/2020	0.109	0.014	--
7/23/2020	0.056	0.007	0.001
7/24/2020	0.042	0.022	0.005
7/25/2020	0.038	0.023	--
7/27/2020	0.192	0.012	0.008
7/28/2020	0.273	0.012	0.004
7/29/2020	0.088	0.018	0.006
7/30/2020	0.078	0.017	0.011
7/31/2020	0.271	0.027	0.009
8/1/2020	0.130	0.014	--
8/3/2020	0.221	0.006	0.003
8/4/2020	0.446	0.024	--

Notes:

-- Indicates that monitoring activities for the day were less than 8 hours.

mg/m^3 - milligrams per cubic meter

PM4 - Particulate matter, respirable fraction

TWA - Time weighted average

Table 8
Remedial Action Cost Summary
Ottawa Radiation Areas, NPL-8 - Frontage Property
Ottawa, LaSalle County, Illinois

Activity/Subcontract	Cost	
Excavation and Waste Management		
Submittals, Permits, and Bonding	$ 88,000	
Site Preparation, Site Maintenance, and Mobilization/Demobilization	$ 191,000	
Waste Excavation and On-Site Management	$ 586,000	
Radioactive Waste Stockpile Construction and Capping	$ 279,000	
Radioactive Waste Off-Site Disposal	$ 14,000	
Dewatering	$ 142,000	
Backfilling	$ 142,000	
Surveying	$ 57,000	
Site Restoration	$ 41,000	
	Subtotal	$ 1,540,000
Health Physics Support and On-Site Analytical Services		$ 380,000
Off-Site Analytical Services		$ 13,000
Support Zone and other Property Access		$ 15,000
Management, Engineering, and Verification Sampling		$ 1,747,000
Total		**$ 3,695,000**

APPENDIX C

SULTRAC WEEKLY REPORTS

APPENDIX D

FIELD LOGBOOK NOTES

APPENDIX E

DATA VALIDATION REPORTS

APPENDIX F

INTERIM SITE INSPECTION REPORTS

APPENDIX G

SULTRAC FINAL INSPECTION REPORT AND PUNCH LIST

ATTACHMENTS